IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OIPE JC130 MAR 2 5 2005 PATENT & TRADEMARK OFFICE

In re Application of:	§	
	§	
David A. Monroe	§	Group Art Unit: 2613
	§	
Serial No.: 09/594,041	§	Examiner: Anand Shashikant Rao
	§	
Filed: June 14, 2000	§	Docket No. 121817.0001.024
	§	
For: **MULTIMEDIA SURVEILLANCE AND MONITORING SYSTEM INCLUDING NETWORK CONFIGURATION**	§	

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AFFIDAVIT OF DAVID A. MONROE UNDER 37 CFR 1.131

David A. Monroe, being duly sworn, states as follows:

1. I am over 21 years of age and am competent to make this declaration.
2. I am the named inventor of the application, U.S. Serial No. 09/594,041, filed on June, 14, 2000.
3. The original disclosure and the first draft of the subject application were prepared well in advance of the earliest filing date of the DaGraca, et. al. U.S. Patent No. 6,646,676 relied on by the Examiner. A written dated disclosure supports this statement and is attached as Exhibit "A" to this affidavit.
4. The subject application was timely filed, being within one year of the first public disclosure of the invention.
5. The above facts establish reduction to practice prior to the earliest effective date of the DaGraca, et. al. U.S. Patent No. 6, 646,676.

Further affiant sayeth naught.

Executed this 23 day of March, 2005, by:

[signature]
David A. Monroe

EXHIBIT "A"

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Suite 700
San Antonio, TX 7823-

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Time: 2:40 p.m.

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From: David Monroe

Phone:

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Fax: 713-221-2113

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San Antonio, TX 7823-

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Phone: **Phone:** (210) 349-2020 ext.

Fax: 713-221-2113 **Fax:** (210) 349-2070

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Fig. 1

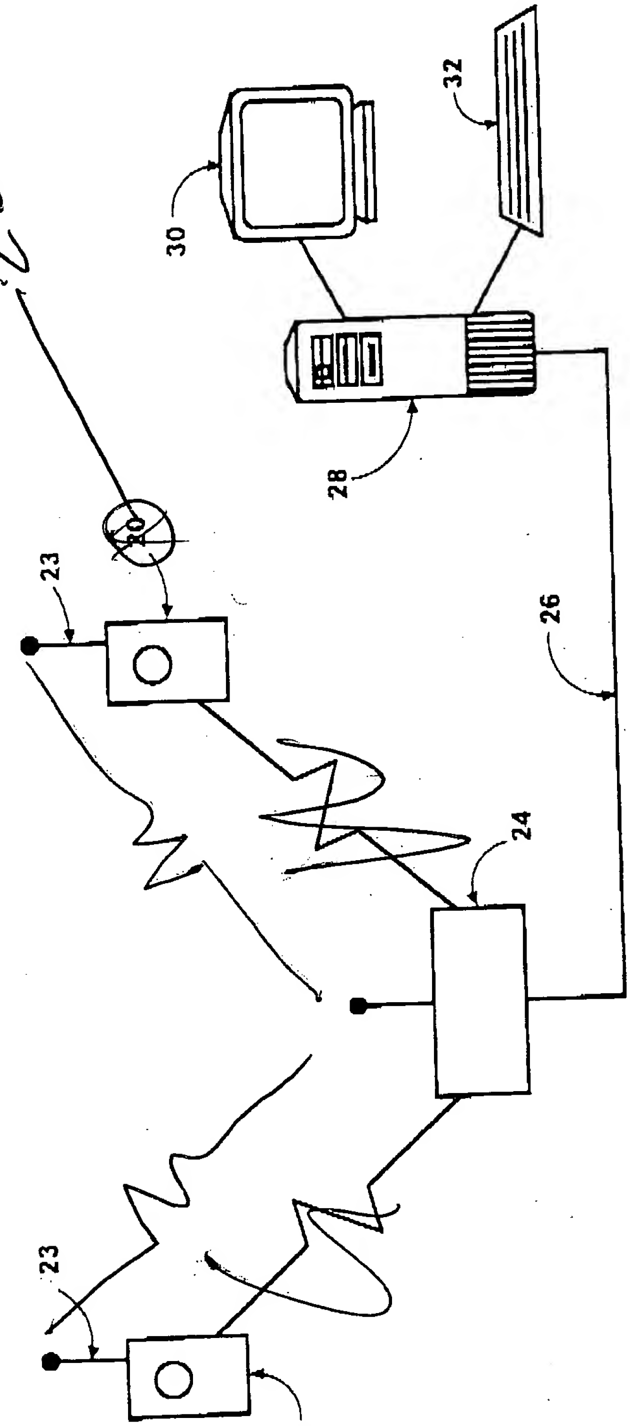


Fig. 2

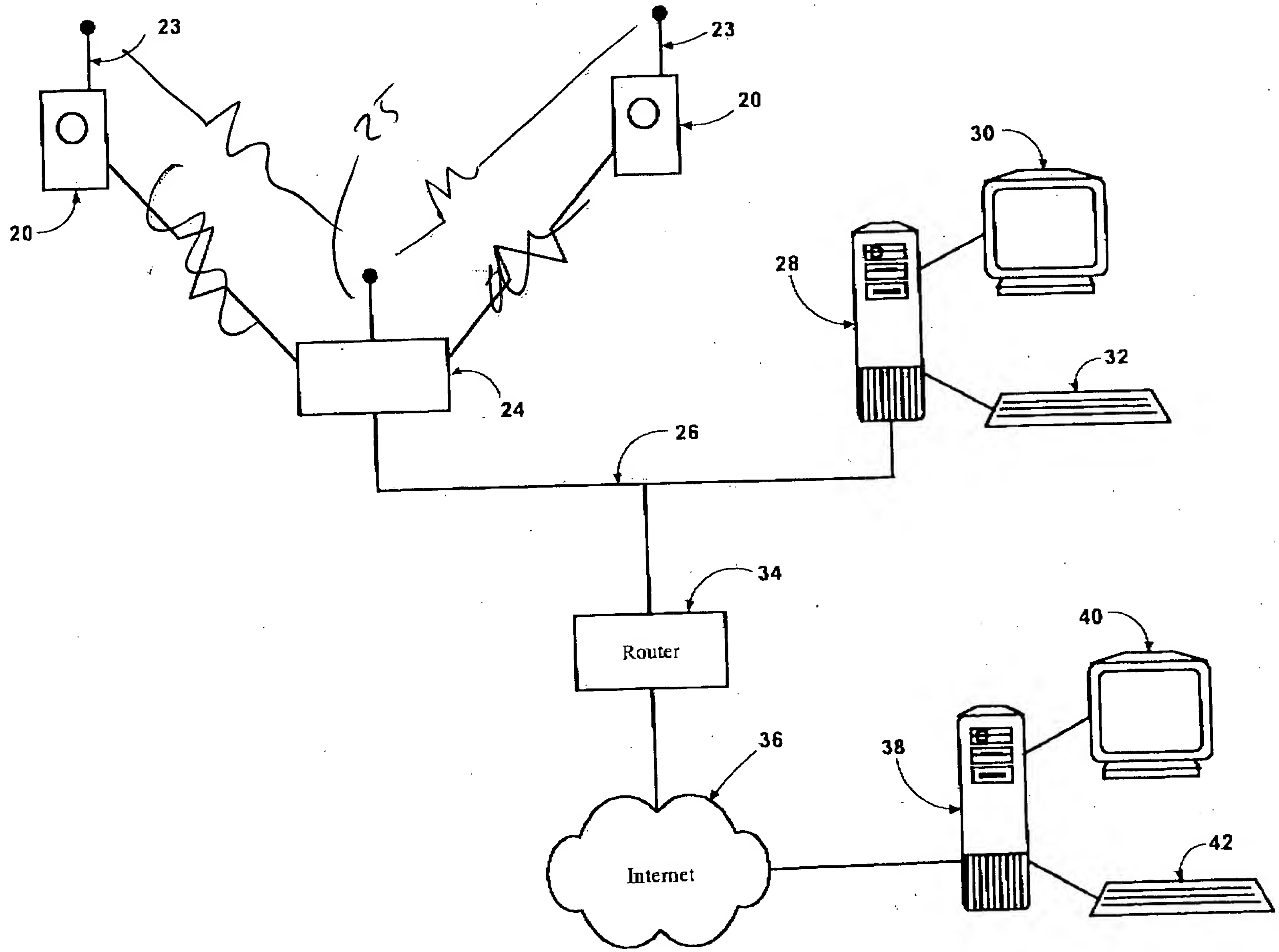


FIG. 3

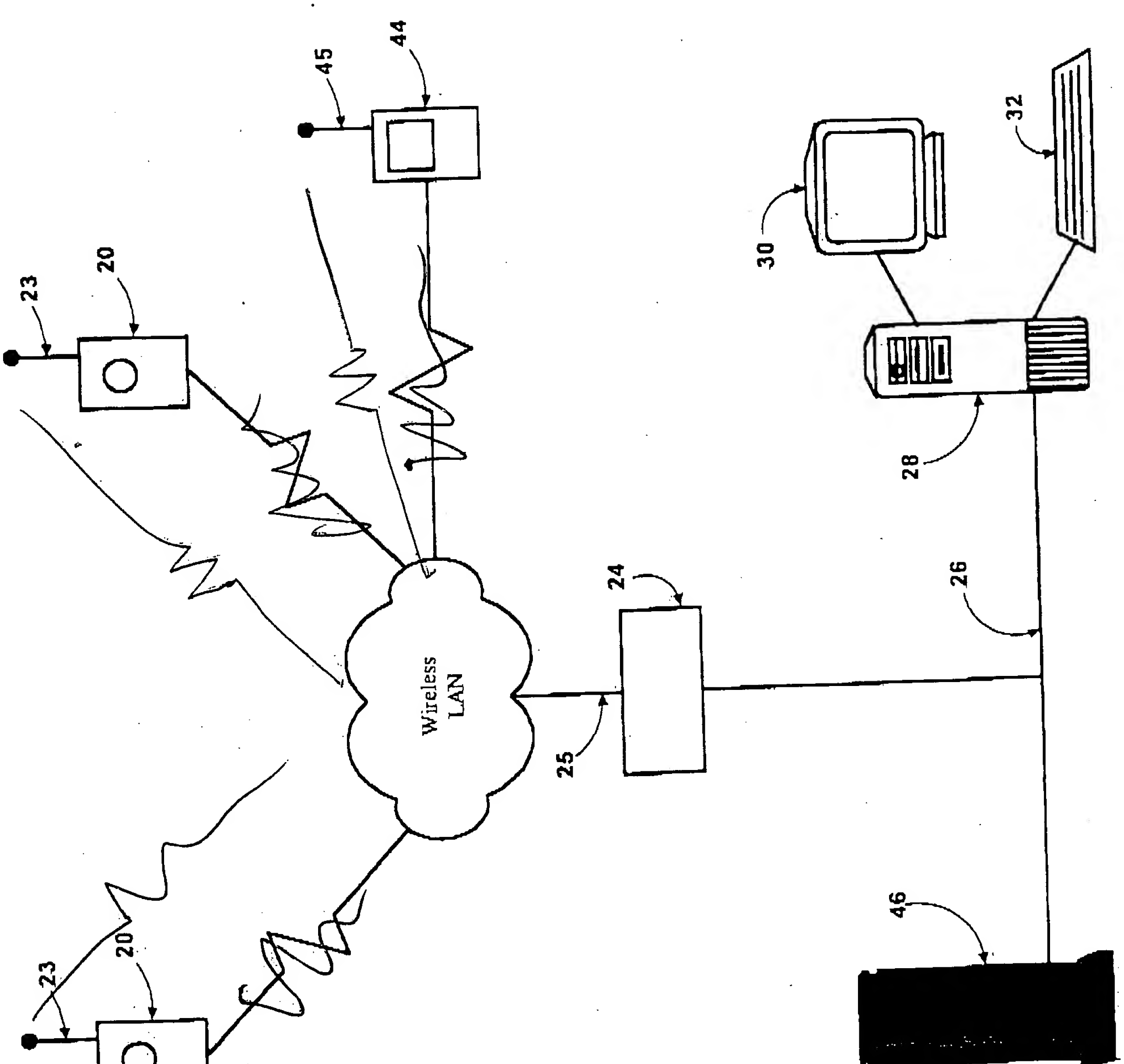


FIG. 4

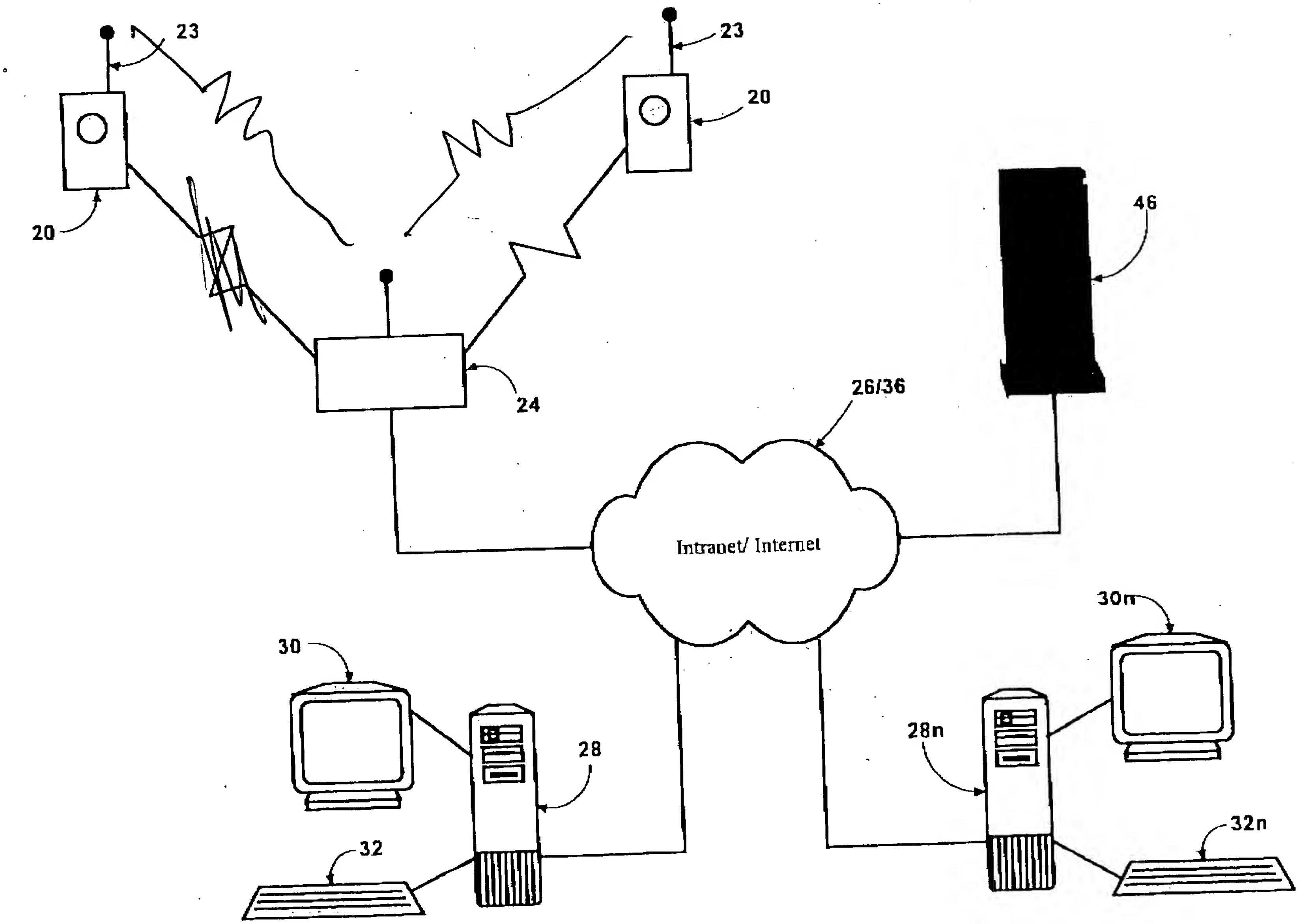
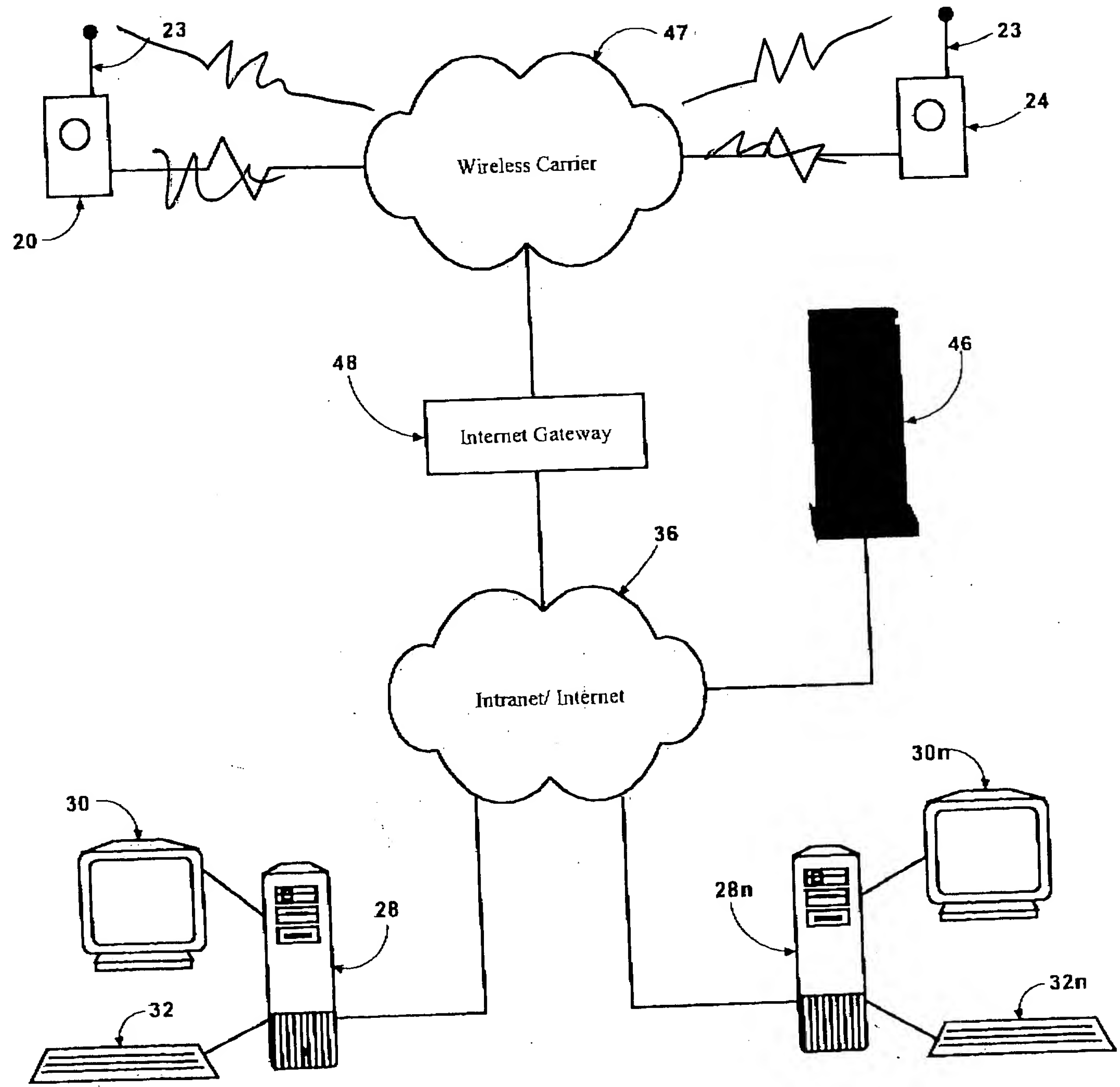
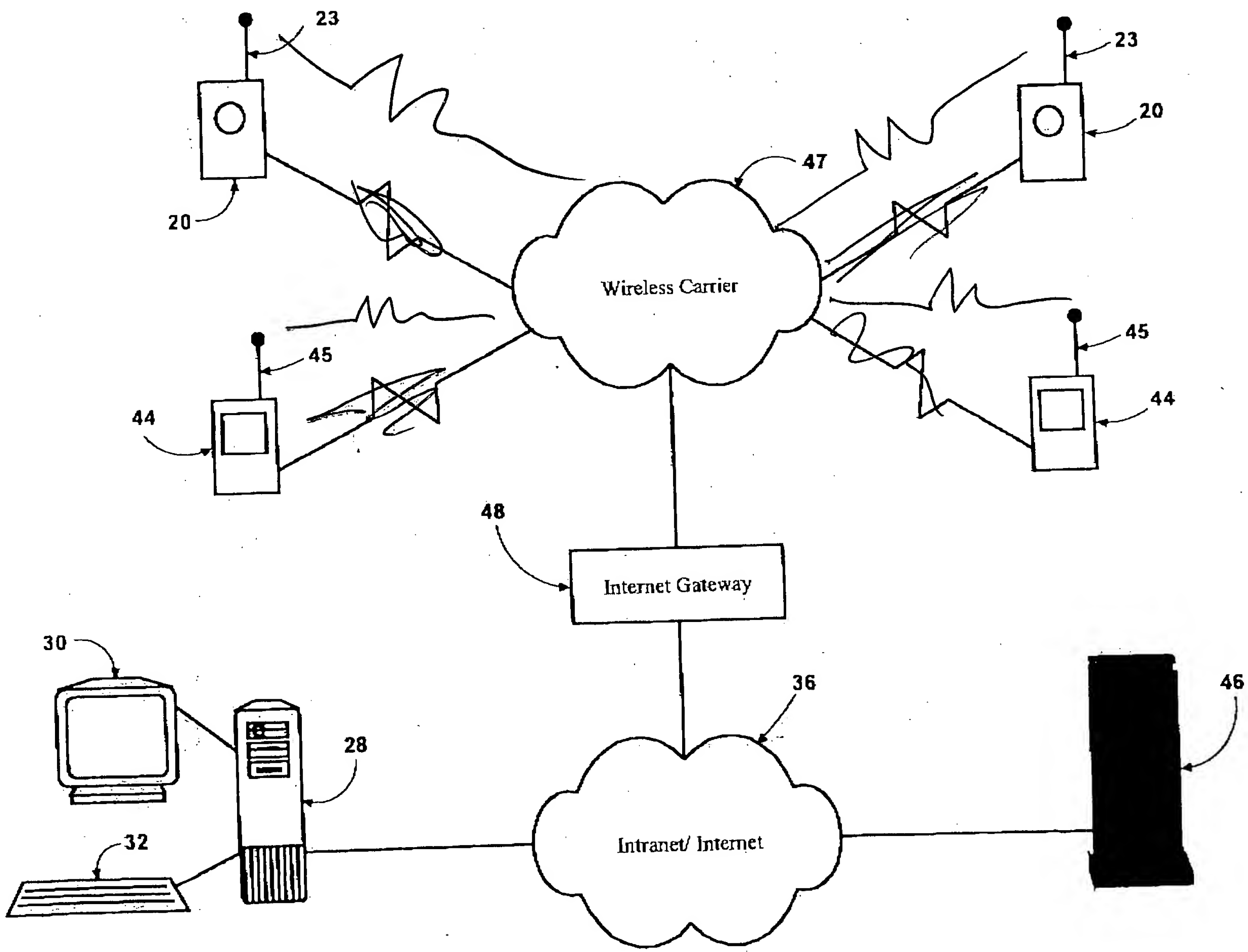


FIG. 5



23
47
23
24
Wireless Carrier
20
48
46
Internet Gateway
36
Intranet/ Internet
30n
30
28
28n
32
32n

FIG. 6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Wireless Carrier
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Internet Gateway
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28
32
Intranet/ Internet

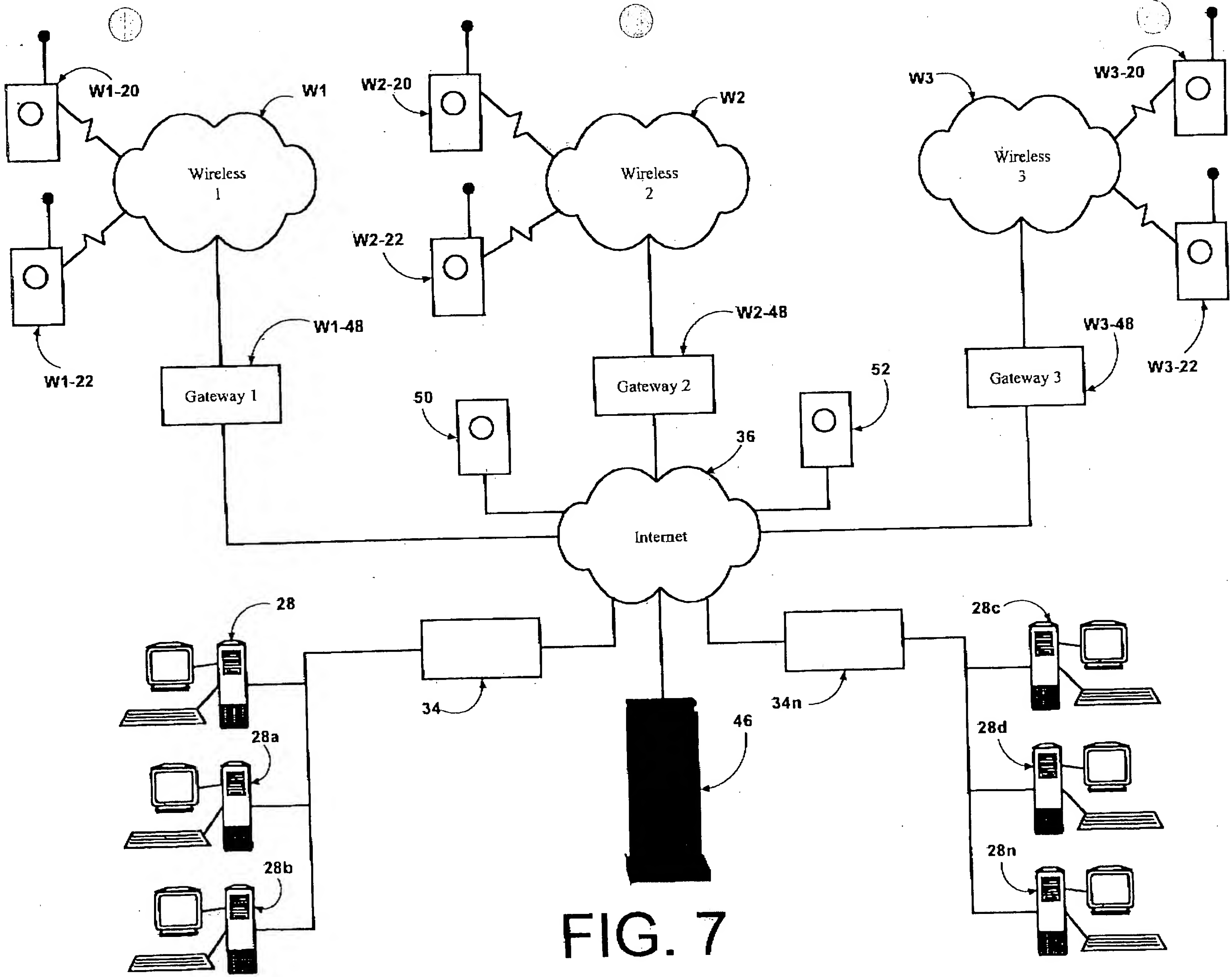

W1-20
W1
W1-22
Wireless 1
W1-48
Gateway 1
W2-20
W2
W2-22
Wireless 2
W2-48
Gateway 2
W3
W3-20
Wireless 3
W3-22
W3-48
Gateway 3
50
52
36
Internet
28
28a
28b
34
46
34n
28c
28d
28n

FIG. 7

FIG. 8

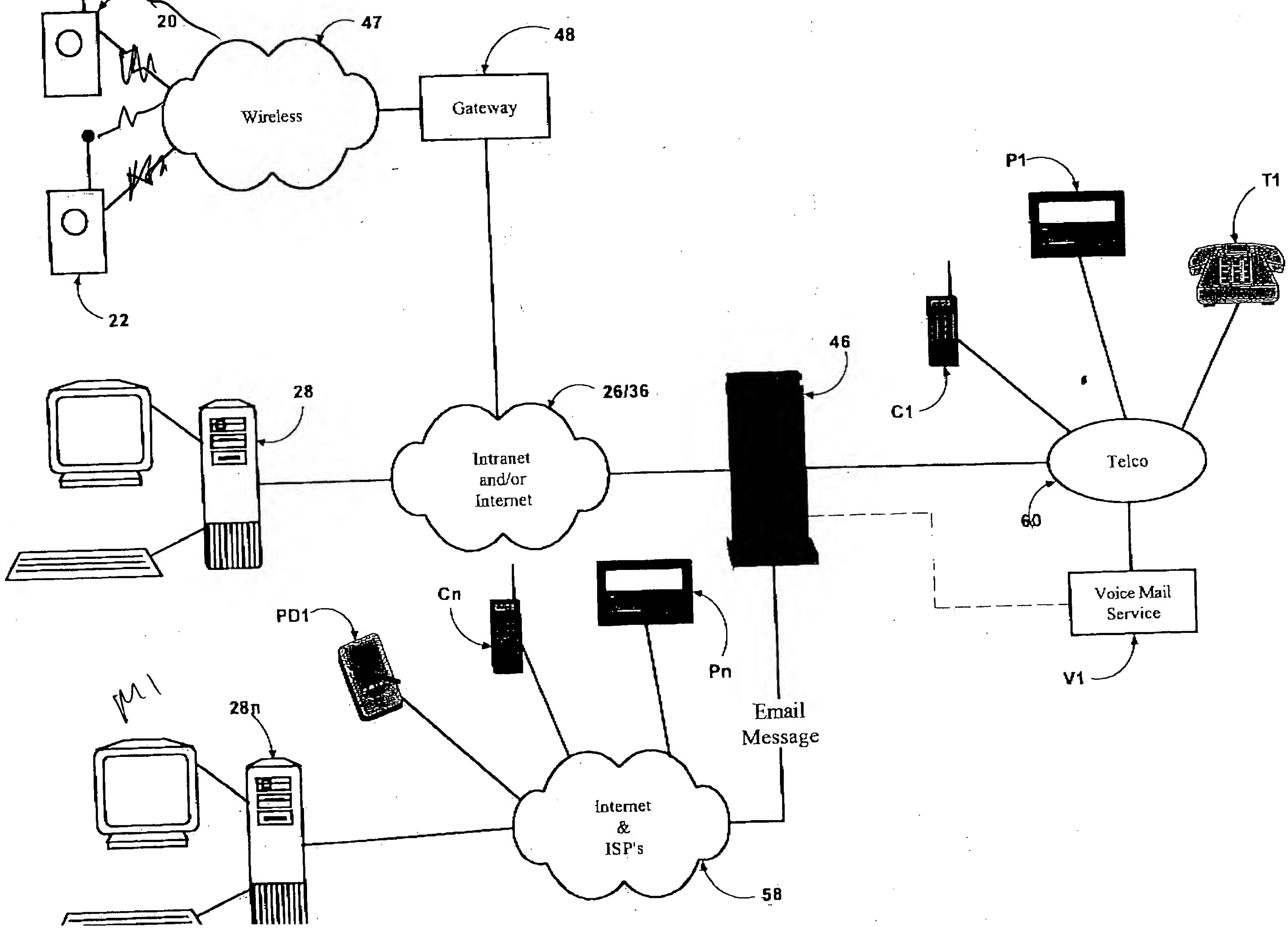

20
47
48
Wireless
Gateway
22
28
26/36
Intranet
and/or
Internet
46
C1
P1
T1
Telco
60
Voice Mail
Service
V1
PD1
Cn
Pn
Email
Message
28n
Internet
&
ISP's
58

FIG. 9

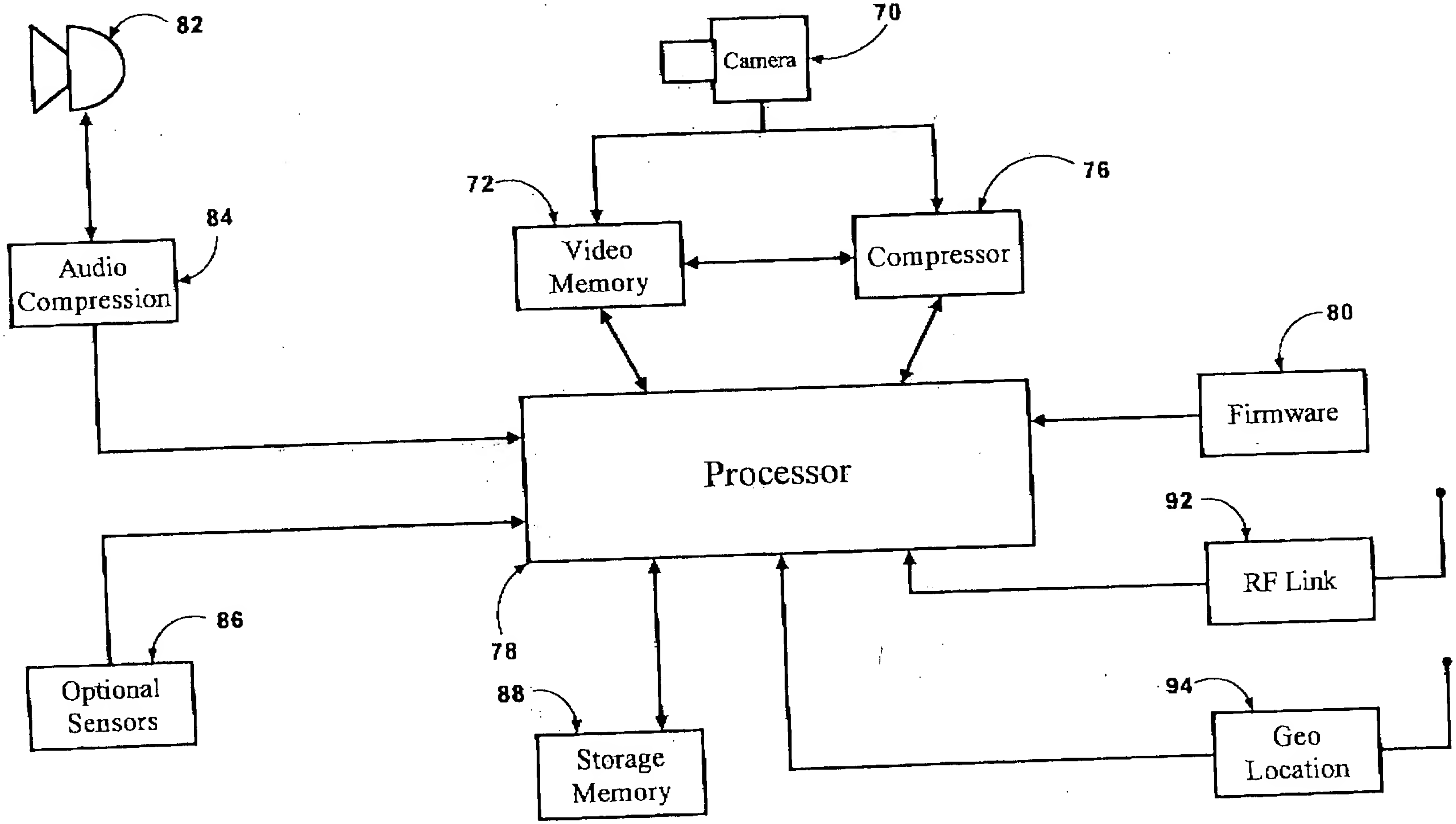
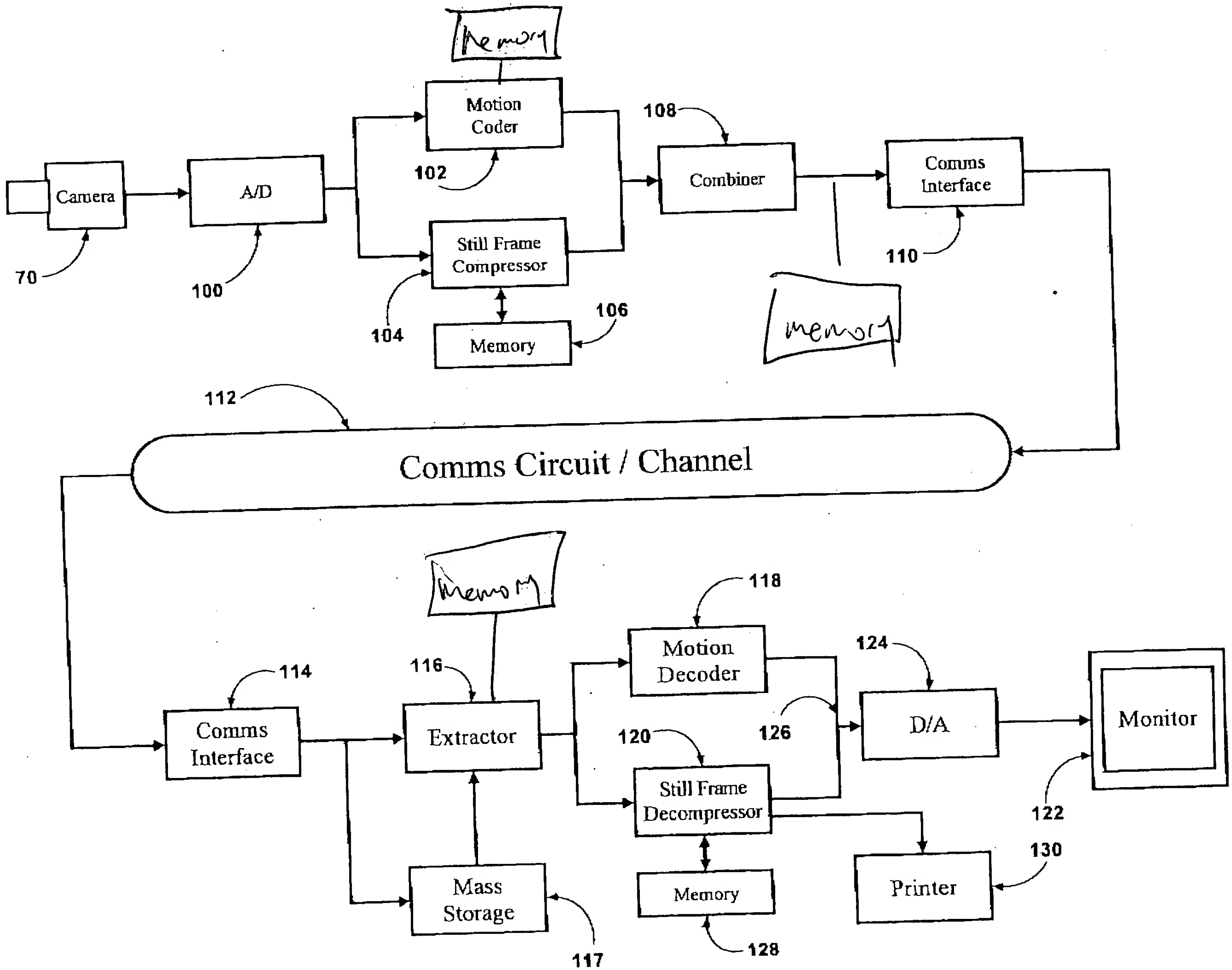

82
84
Audio Compression
86
Optional Sensors
70
Camera
72
Video Memory
76
Compressor
Processor
78
88
Storage Memory
80
Firmware
92
RF Link
94
Geo Location

FIG. 10



Memory
Motion Coder
102
Camera
70
A/D
100
Still Frame Compressor
104
Memory
106
108
Combiner
Comms Interface
110
memory
112
Comms Circuit / Channel
Memory
118
Motion Decoder
124
114
116
Comms Interface
Extractor
120
126
D/A
Monitor
Still Frame Decompressor
122
130
Mass Storage
Memory
Printer
117
128

FIG. 1

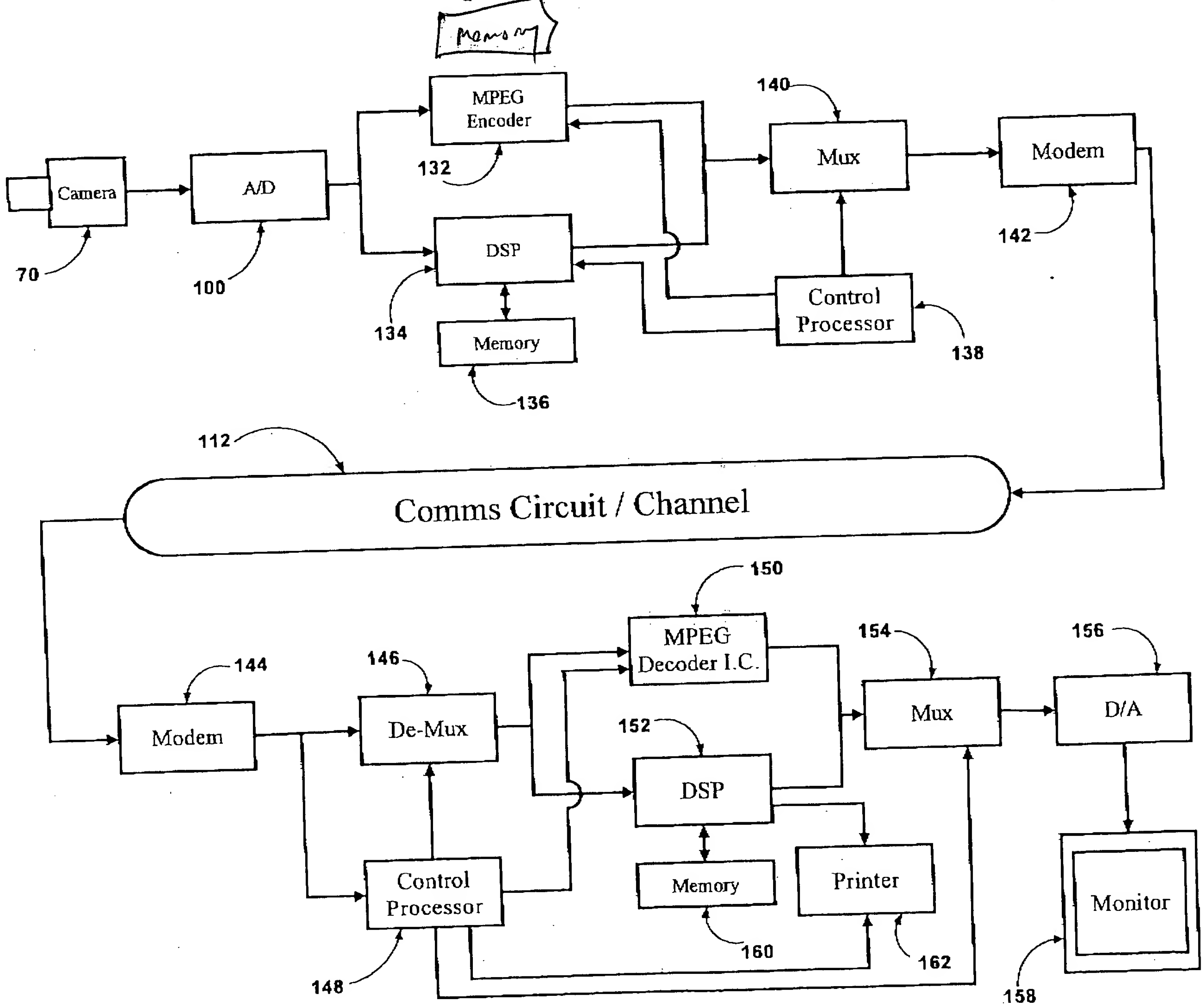
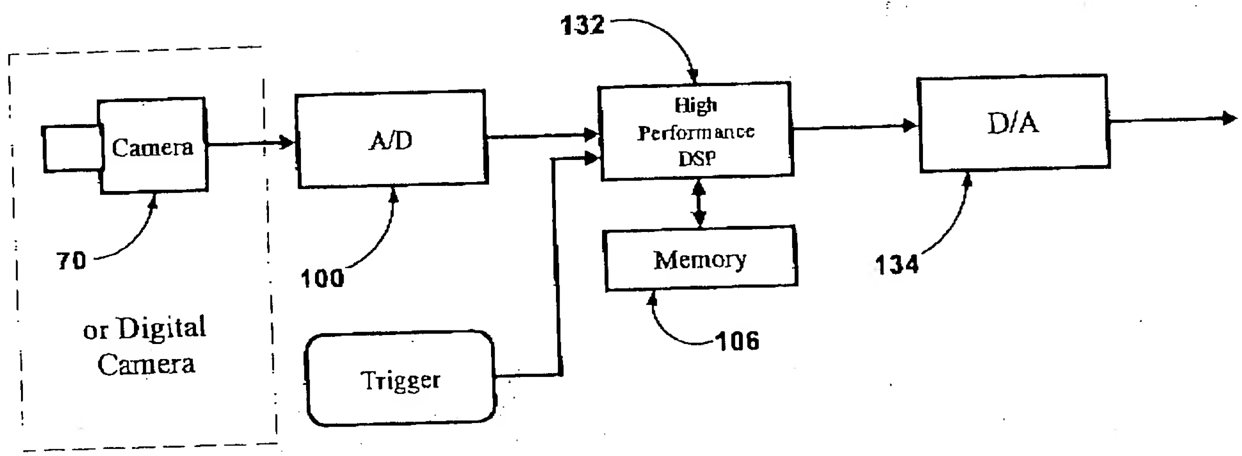

Memory
MPEG Encoder
132
Camera
70
A/D
100
DSP
134
Memory
136
140
Mux
Modem
142
Control Processor
138
112
Comms Circuit / Channel
150
MPEG Decoder I.C.
144
Modem
146
De-Mux
152
DSP
154
Mux
156
D/A
Memory
160
Printer
162
Control Processor
148
Monitor
158

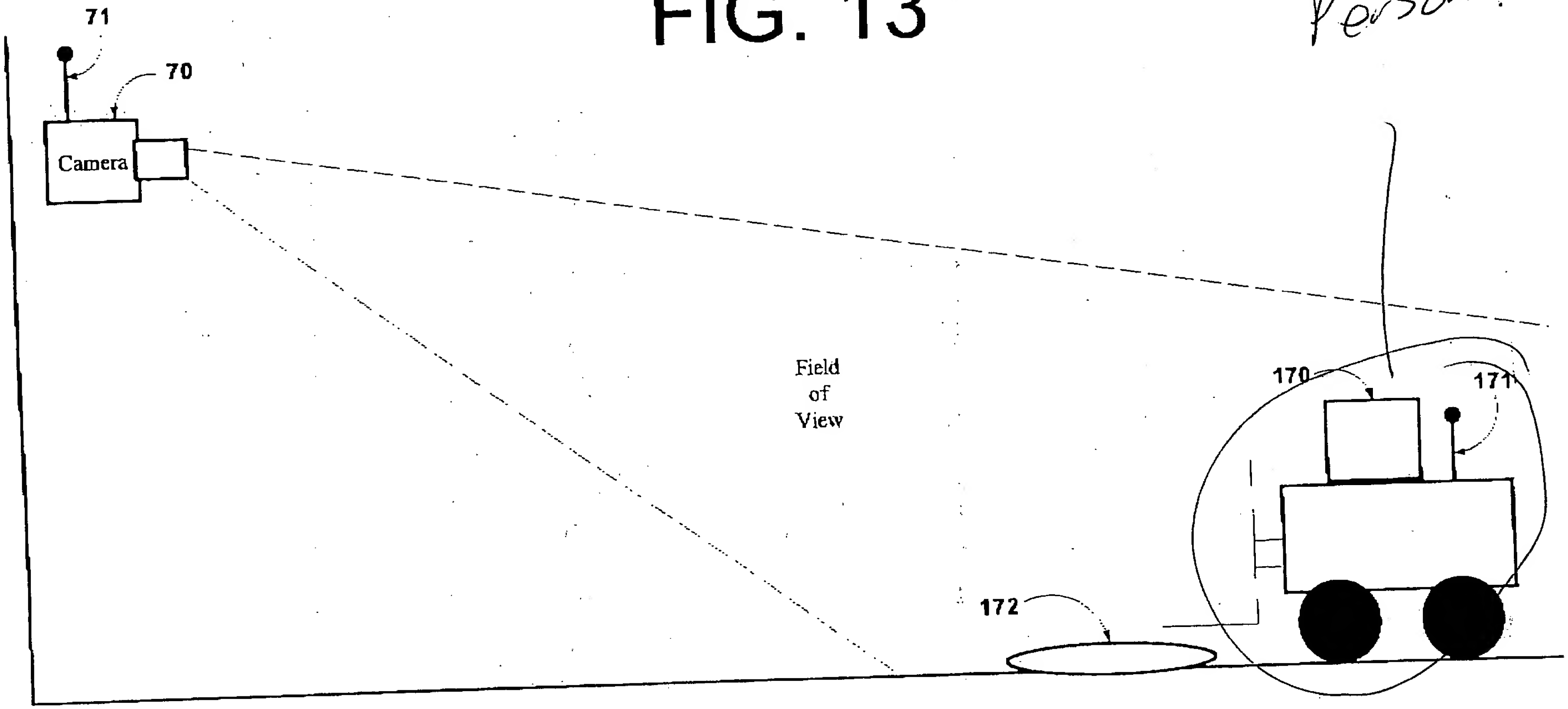
FIG. 12



Camera
70
or Digital
Camera
A/D
100
Trigger
132
High
Performance
DSP
Memory
106
D/A
134

FIG. 13

Change to Person?



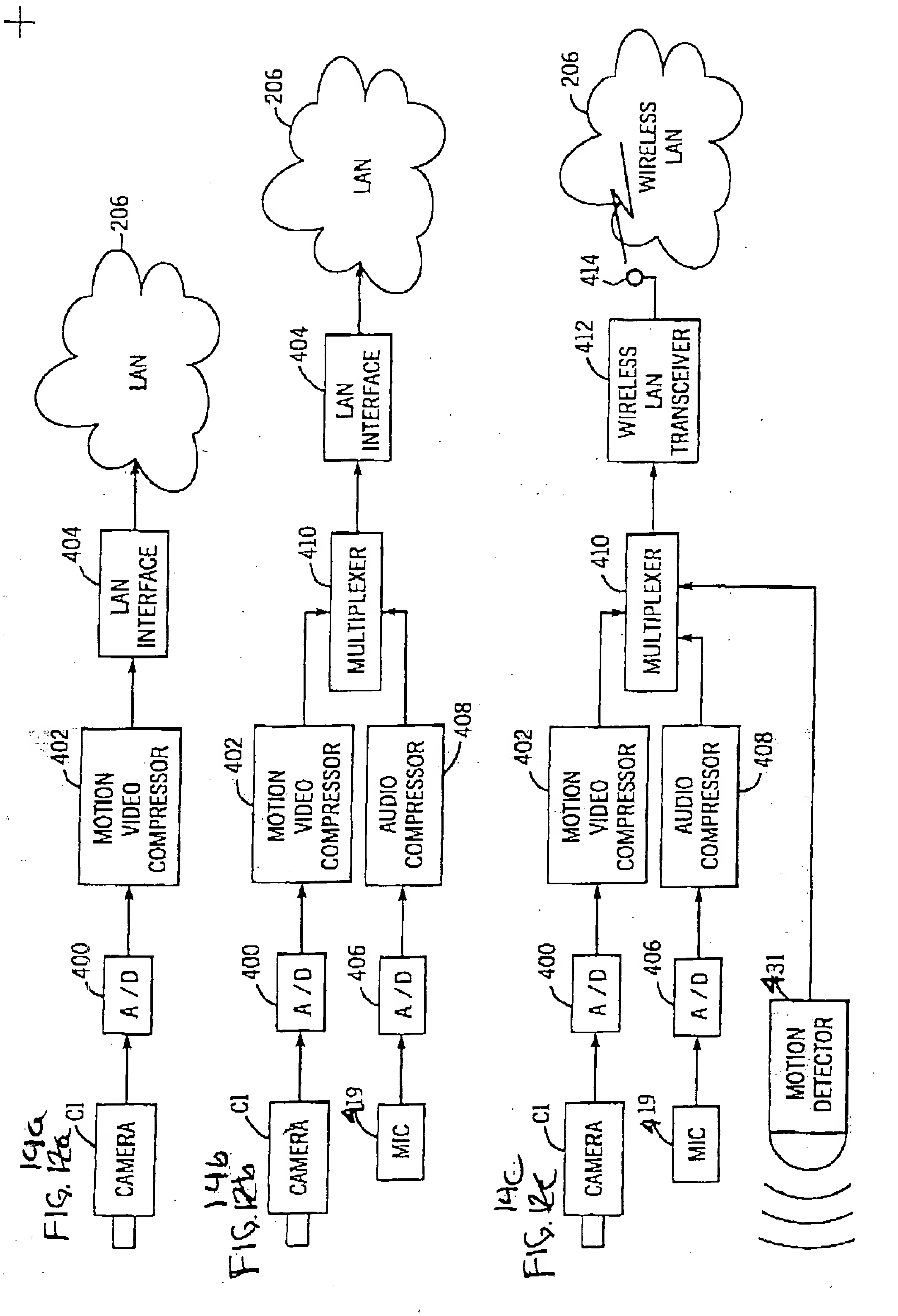


FIG. 12a 14a
CAMERA
C1
A / D
400
MOTION VIDEO COMPRESSOR
402
LAN INTERFACE
404
LAN
206
FIG. 12b 14b
CAMERA
C1
MIC
419
A / D
400
A / D
406
MOTION VIDEO COMPRESSOR
402
AUDIO COMPRESSOR
408
MULTIPLEXER
410
LAN INTERFACE
404
LAN
206
FIG. 12c 14c
CAMERA
C1
MIC
419
MOTION DETECTOR
431
A / D
400
A / D
406
MOTION VIDEO COMPRESSOR
402
AUDIO COMPRESSOR
408
MULTIPLEXER
410
WIRELESS LAN TRANSCEIVER
412
414
WIRELESS LAN
206

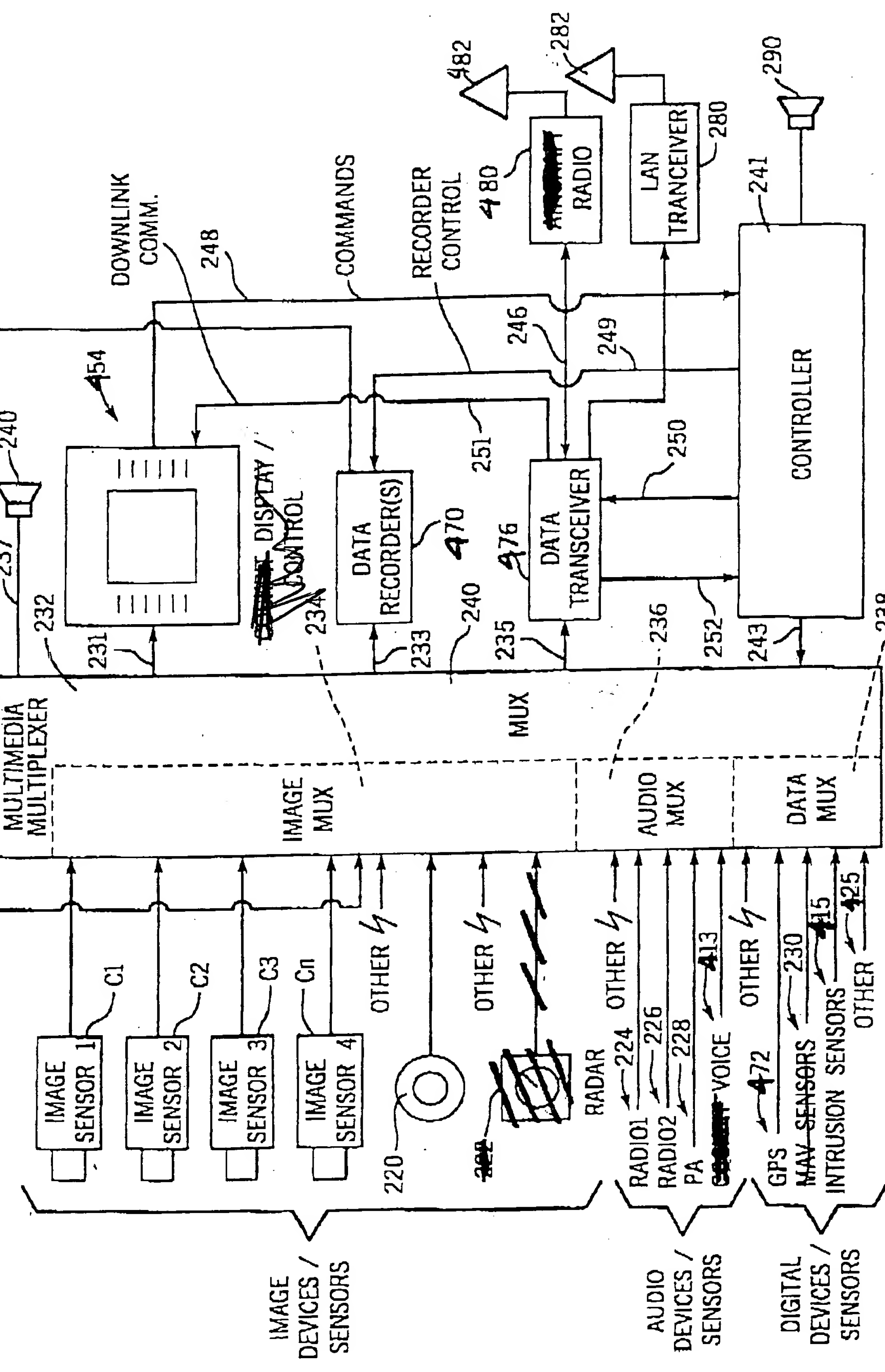
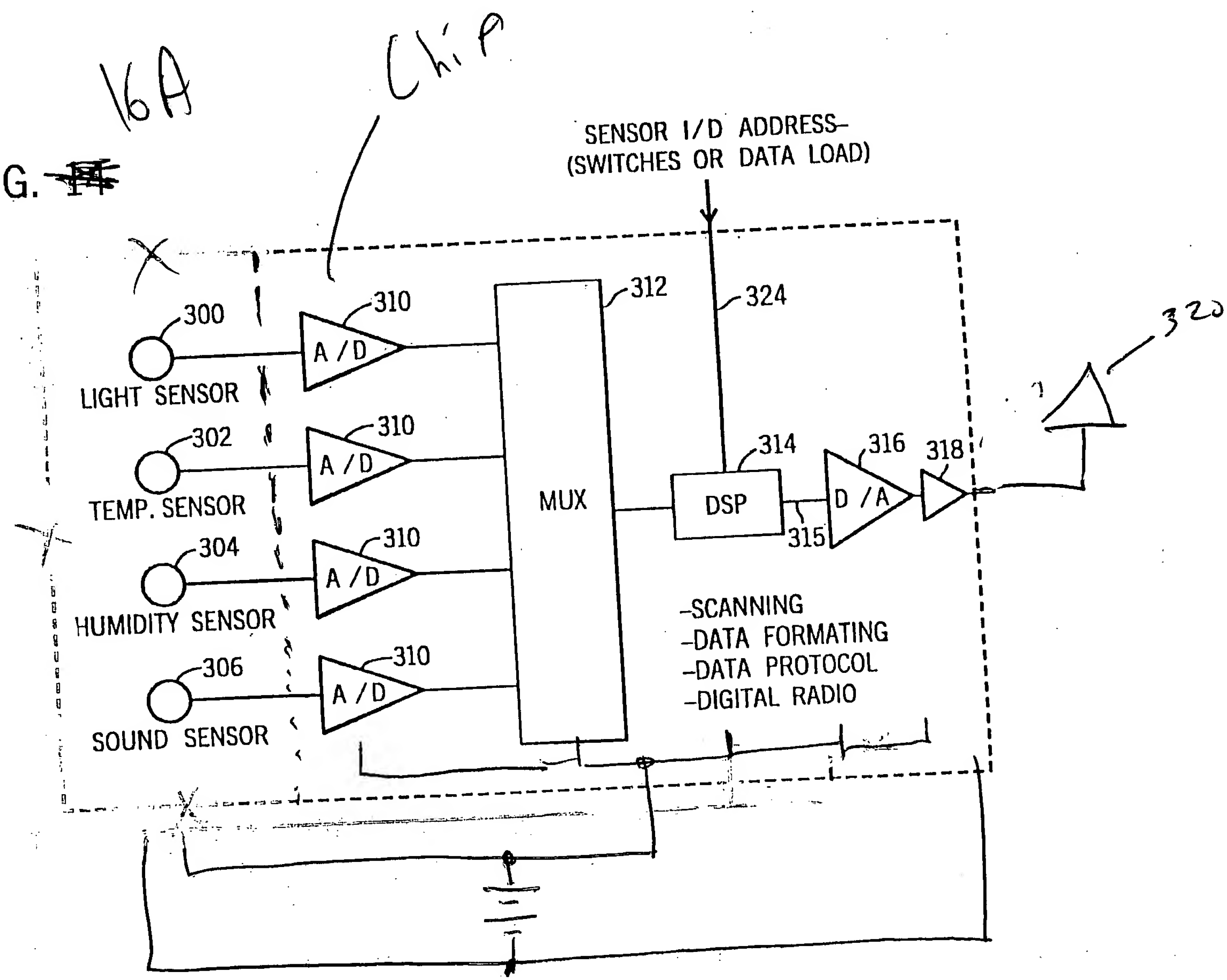


FIG. 15

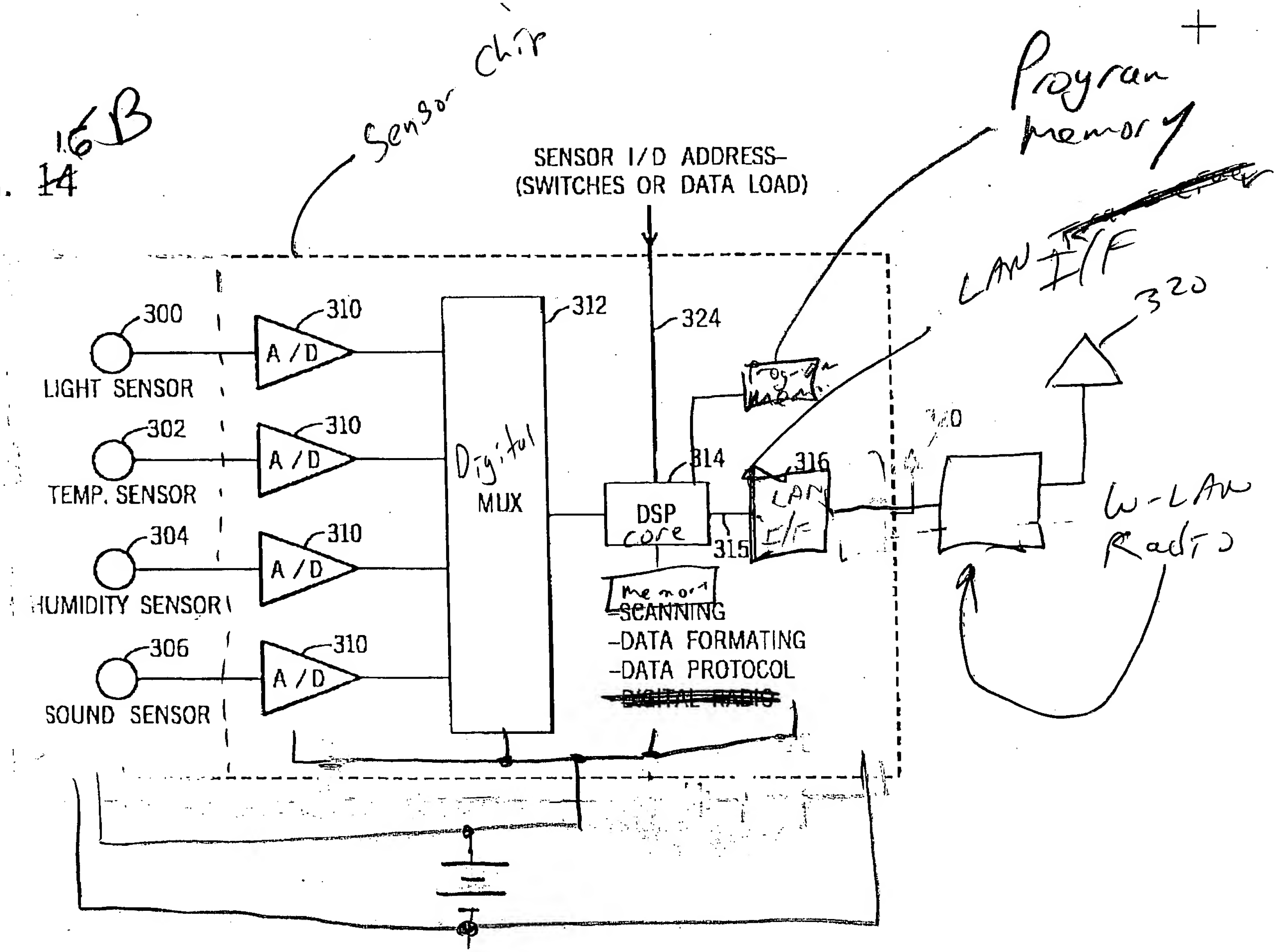
Does the use of the word "Cockpit", in Cockpit Display Control, limit the scope of use? (Help; No?

FIG. ~~14~~ 16A



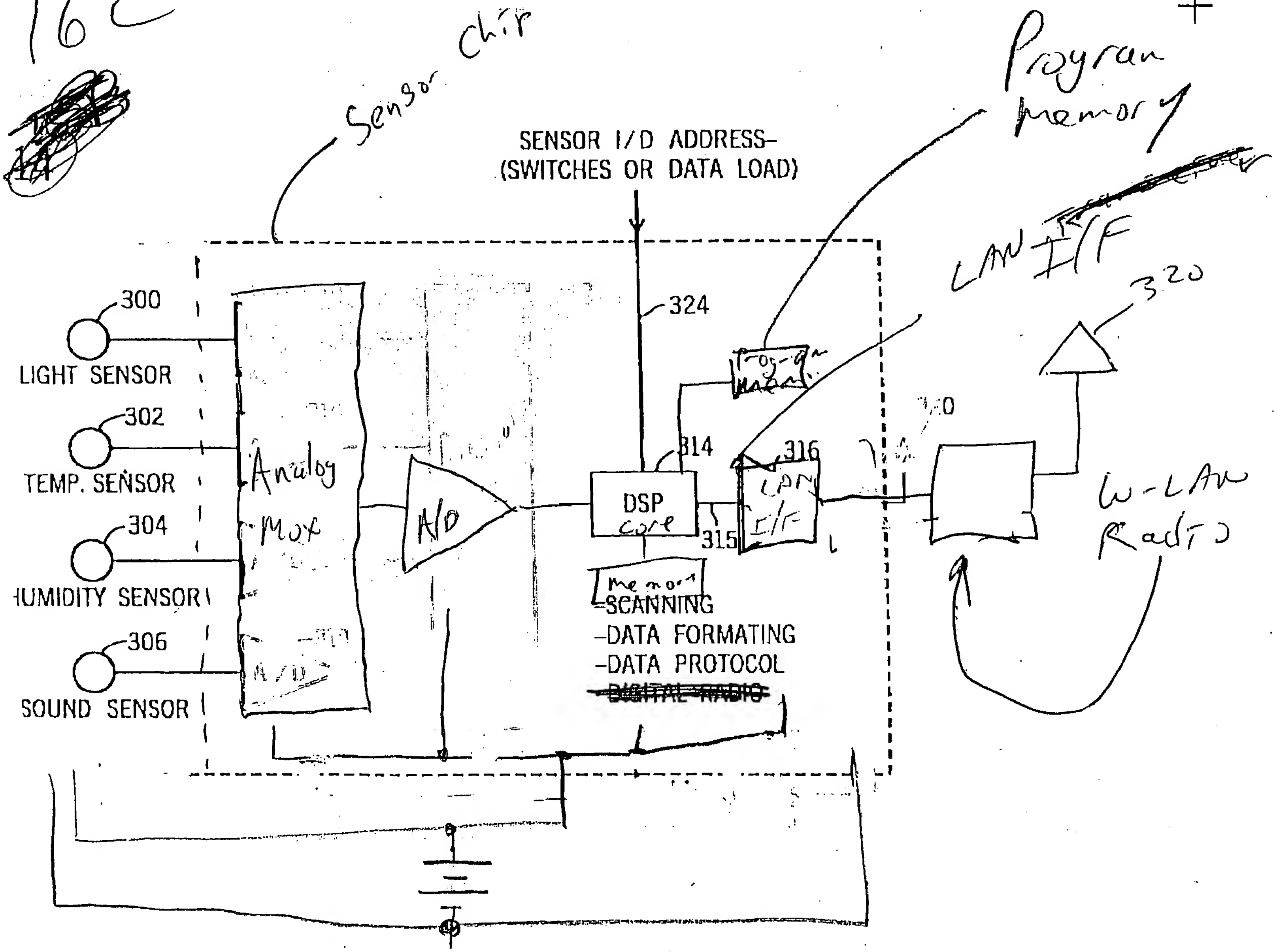
Fully Integrated Sensor System

FIG. ~~14~~ 16B



Integrated Sensor System with Digital multiplex

FIG. ~~14~~ 16C



+ Integrated Sensor ~~Chip~~ System with Analog Multplexor

Sensor System w/ Digital multiplex

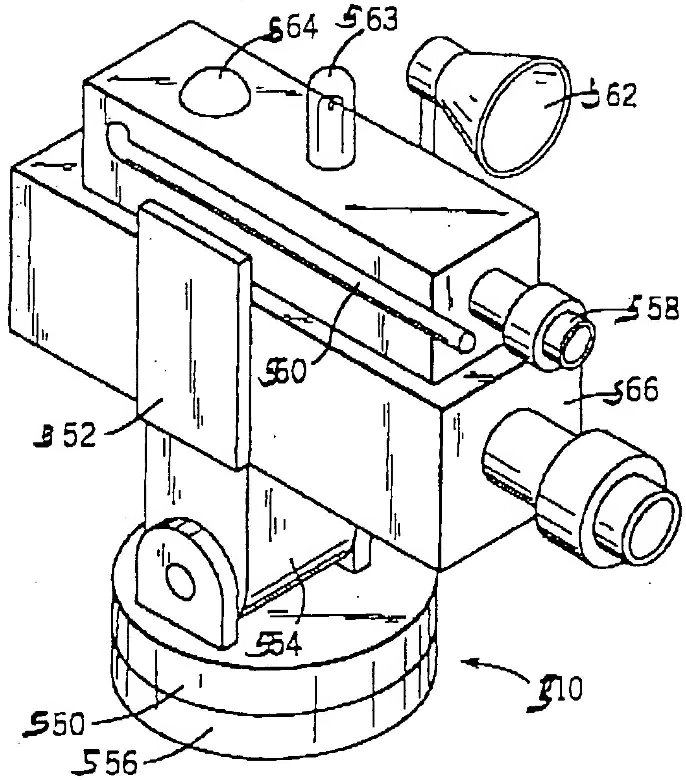
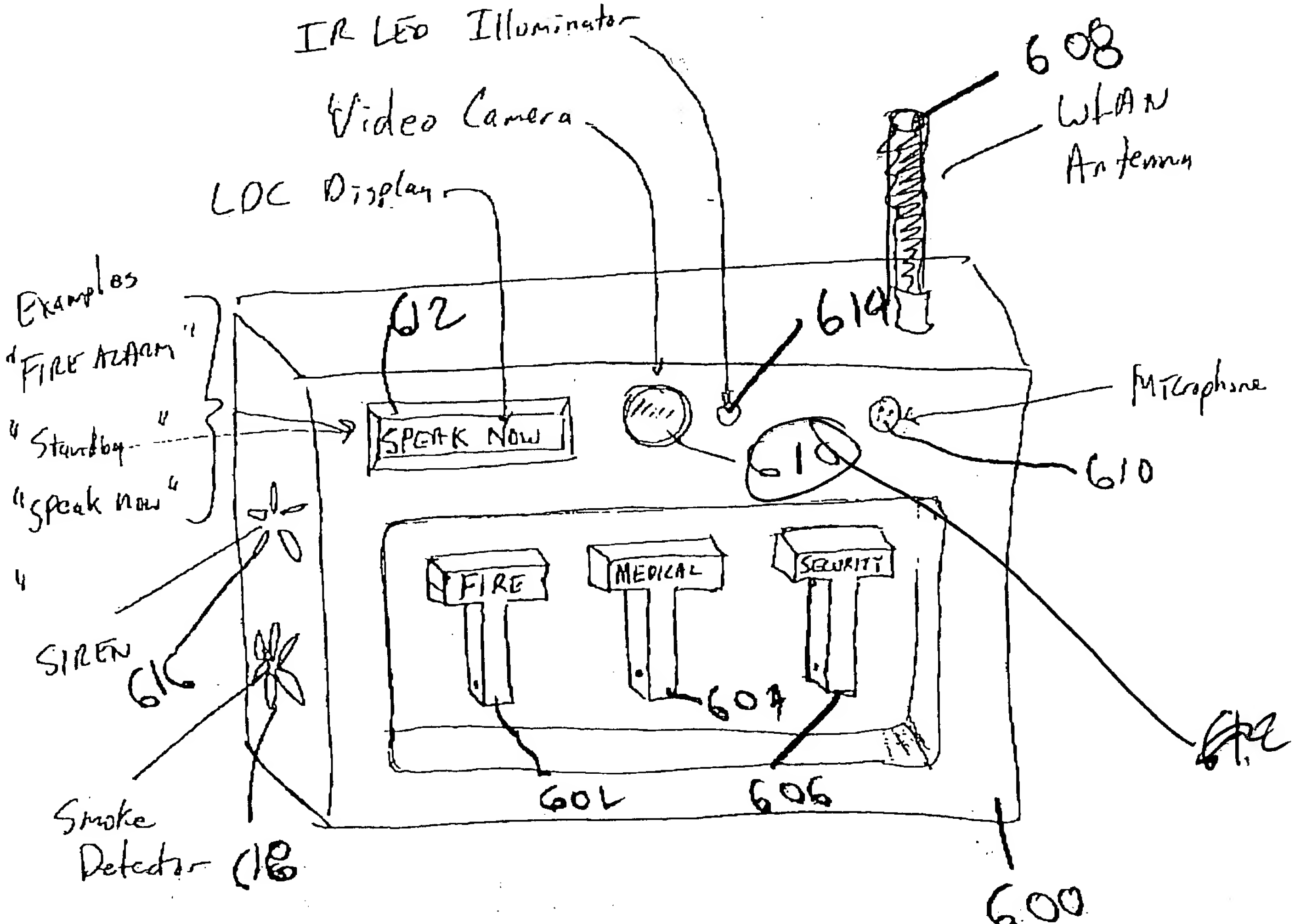


FIG. 17



Wireless Alarm Unit

Fig. 18

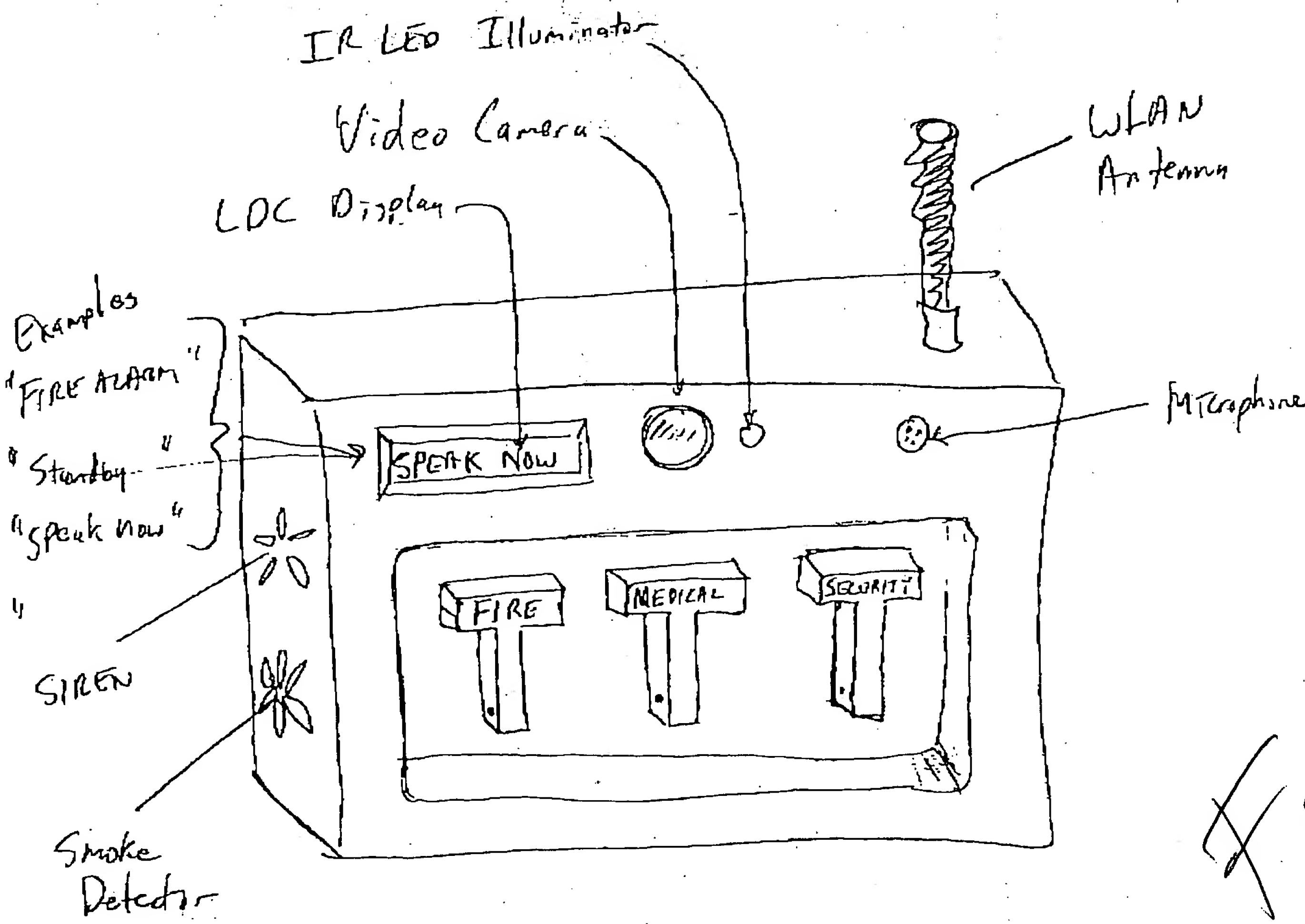


Figure 16

Wireless Alarm Unit

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ATTORNEYS AT LAW

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South Tower
800 North Shoreline Boulevard
Corpus Christi, Texas 78401-3700
361.882.6644
Fax: 361.882.6659

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Dallas, Texas 75201-3387
214.758.1000
Fax: 214.758.1010

Fort Worth
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Ft. Worth, Texas 76102-3708
817.348.0700
Fax: 817.348.0711

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San Antonio, Texas 78205-3603
210.226.1166
Fax: 210.226.1133

Washington, D.C.
2000 K Street NW, Suite 500
Washington, D.C. 20006-1872
202.828.5800
Fax: 202.223.1225

London
33 Davies Street
London W1Y 1FN England
011.44.207.355.3330
Fax: 011.44.207.355.4440

Kazakhstan
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480091 Almaty, Kazakhstan
011.73272.581.400
Fax: 011.73272.581.444

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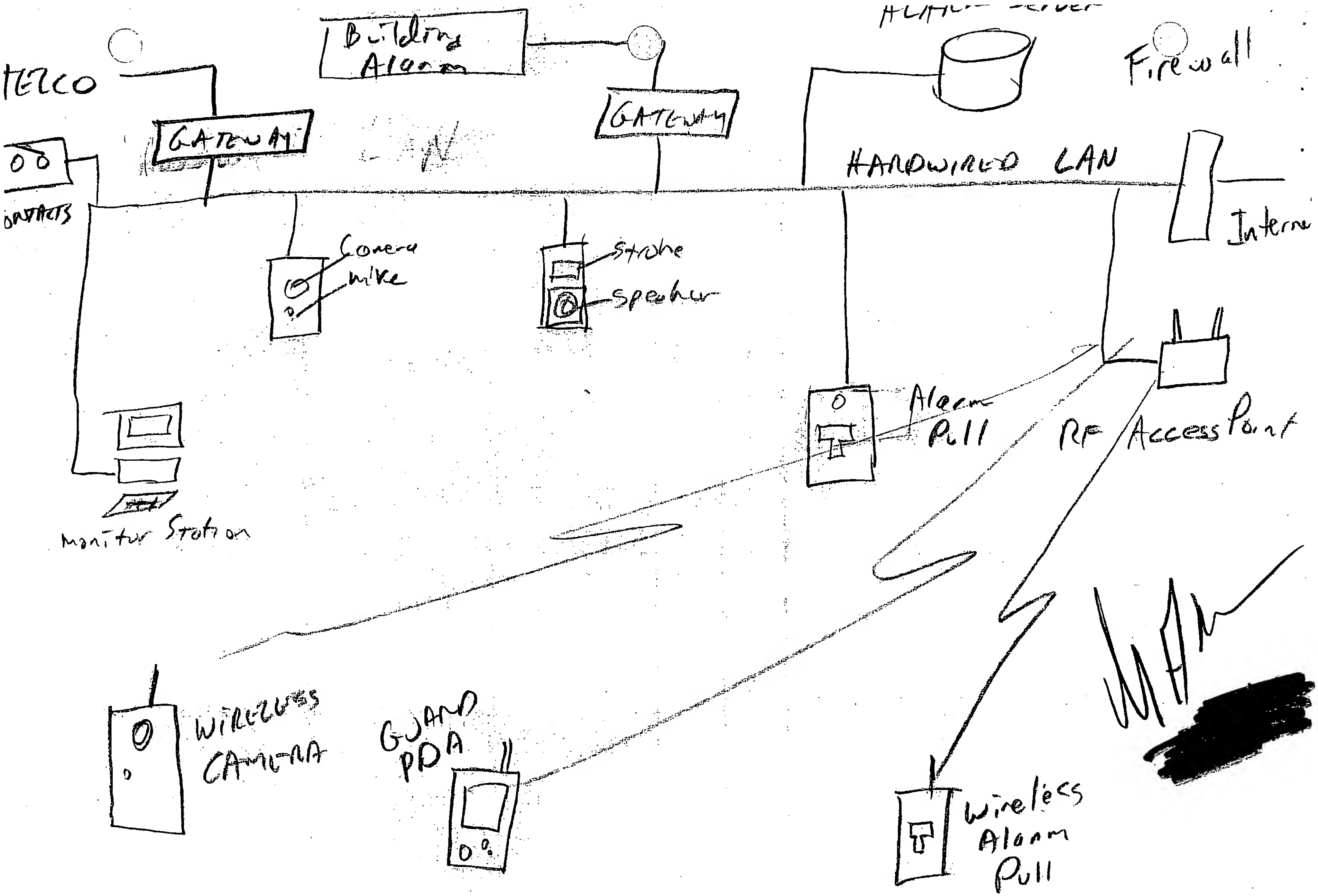
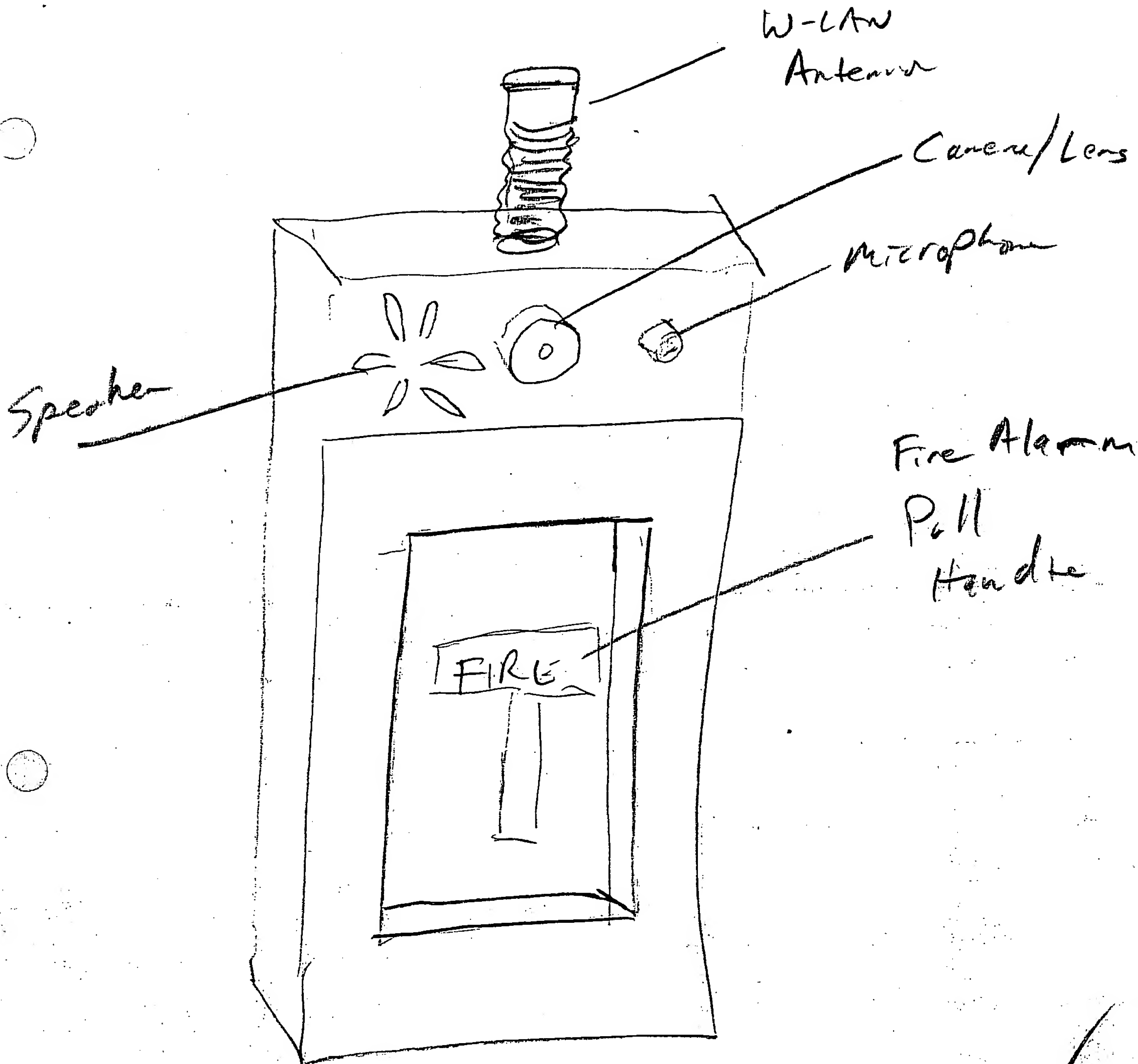
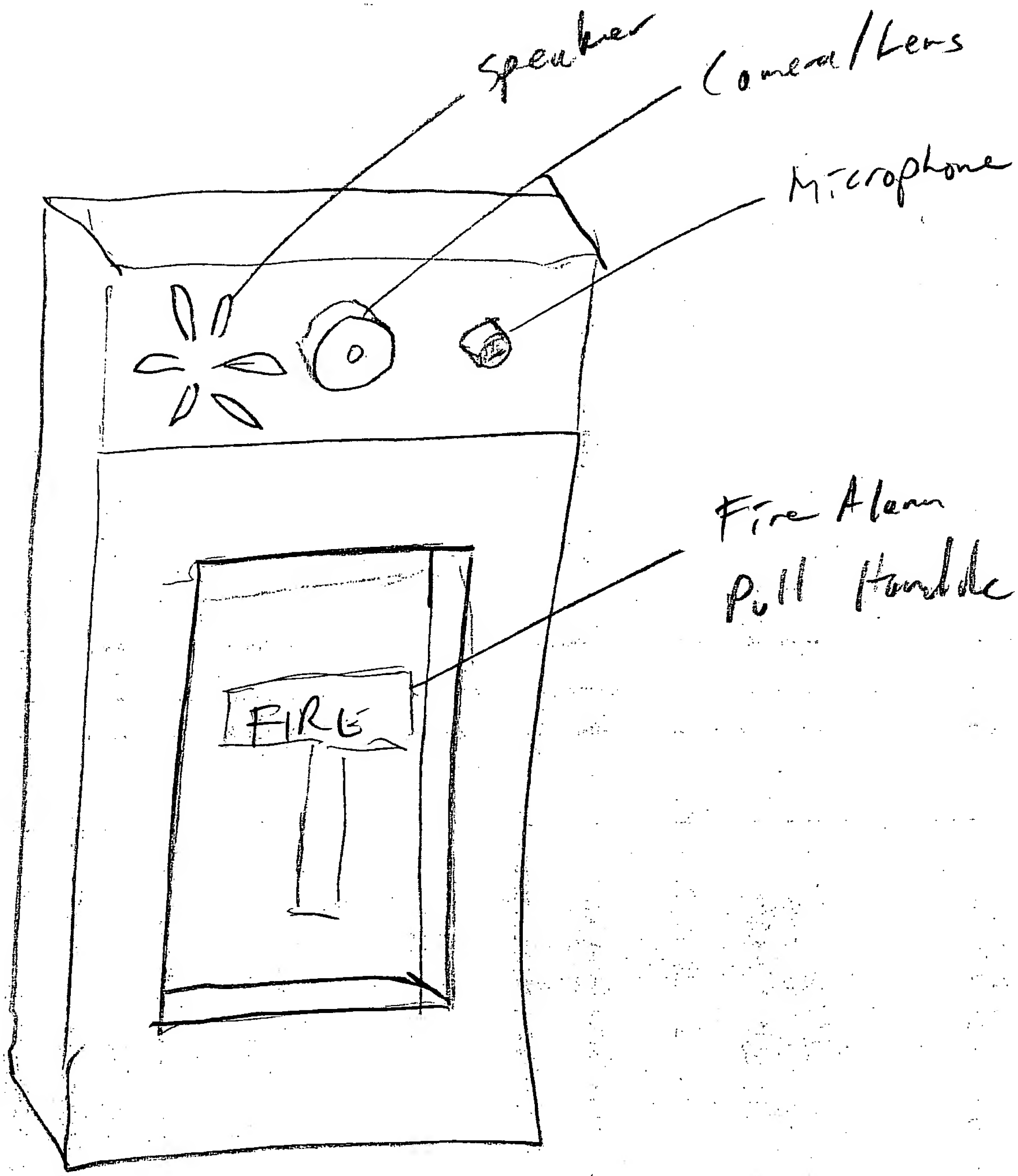


System Concept



[redacted]

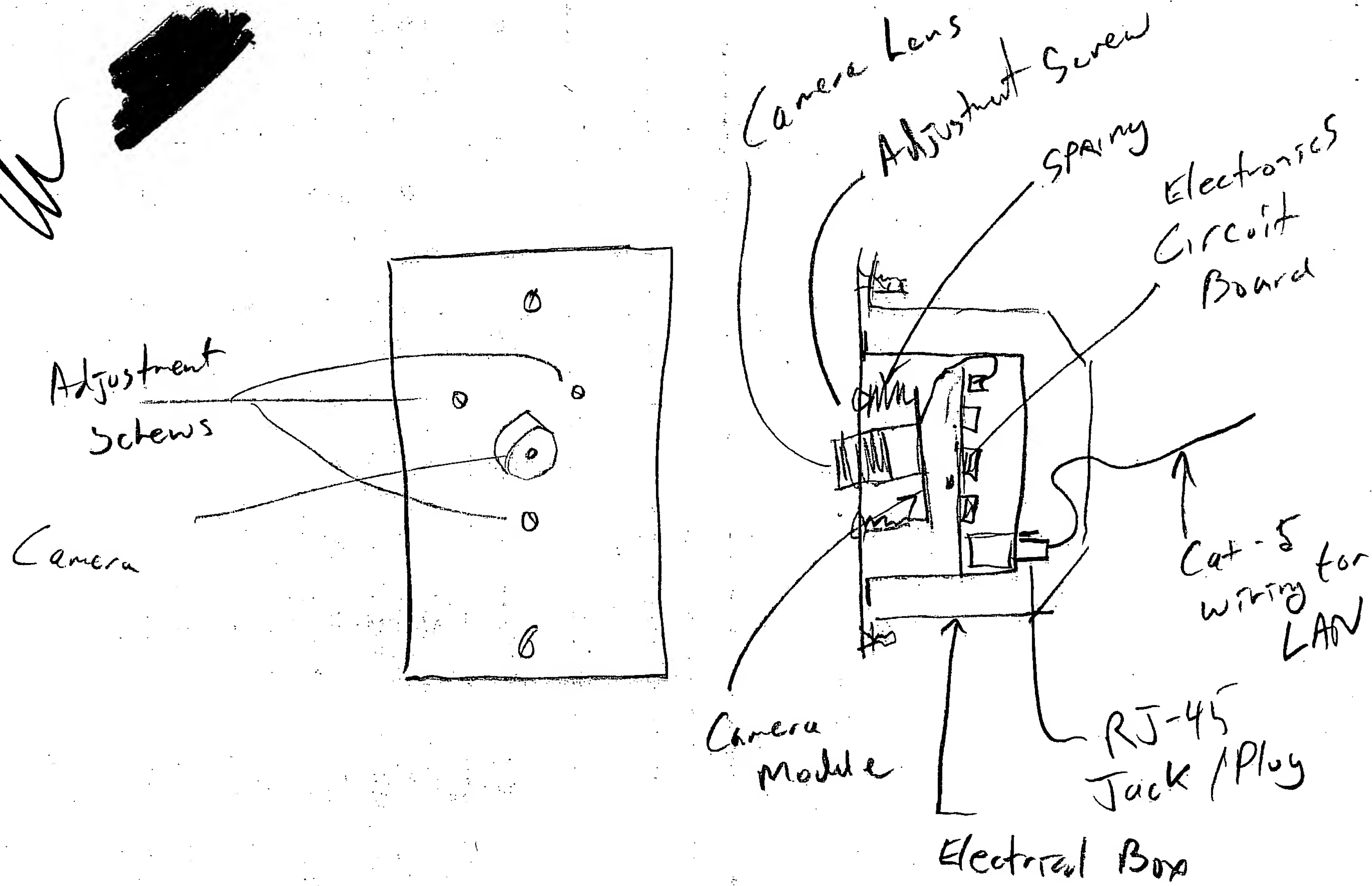
Wireless I/P Fire Alarm
Multimedia Station



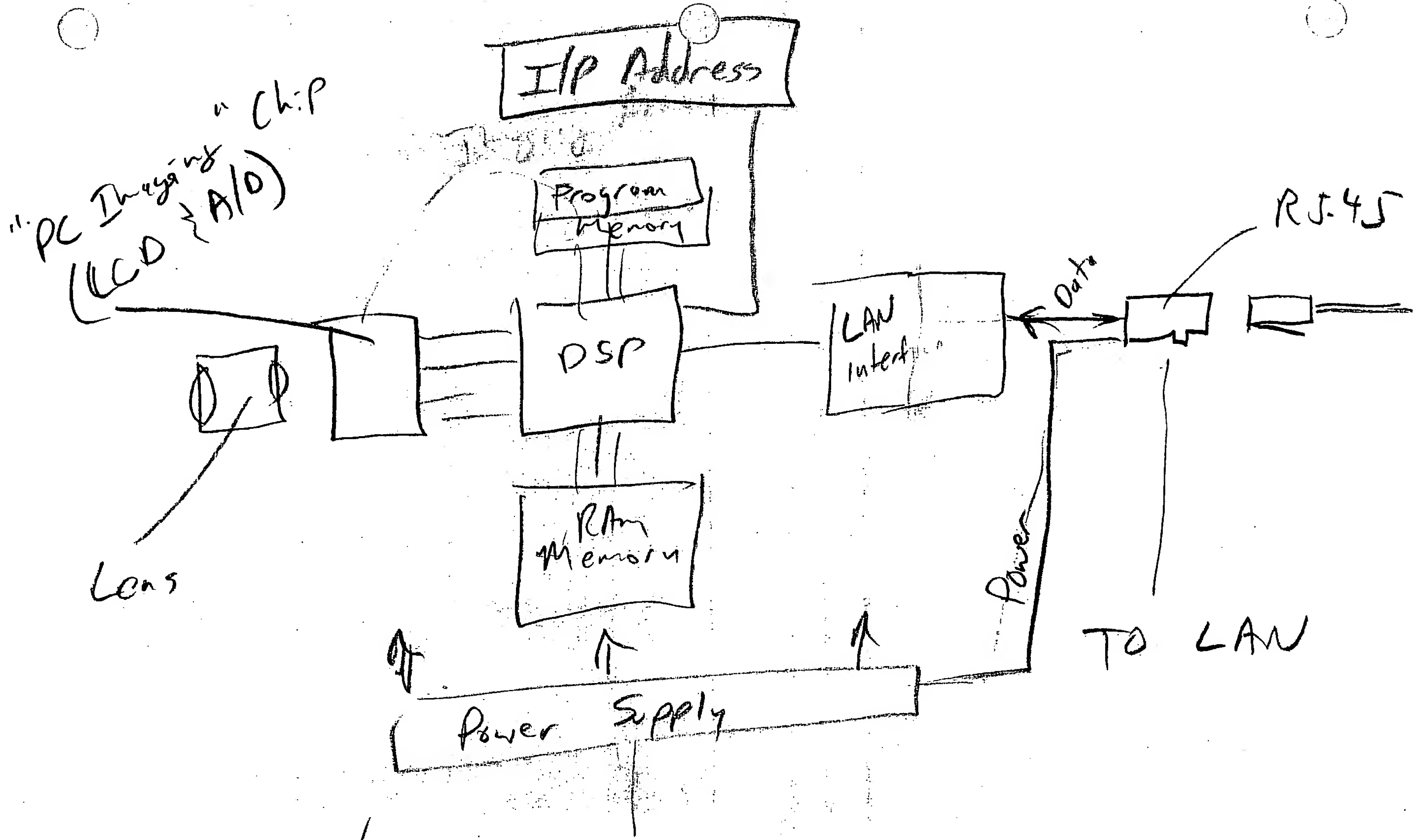
[redacted]

I/P Fire Alarm
Multimedia Station

[redacted]



Basic IP Video Camera
Physical illustration

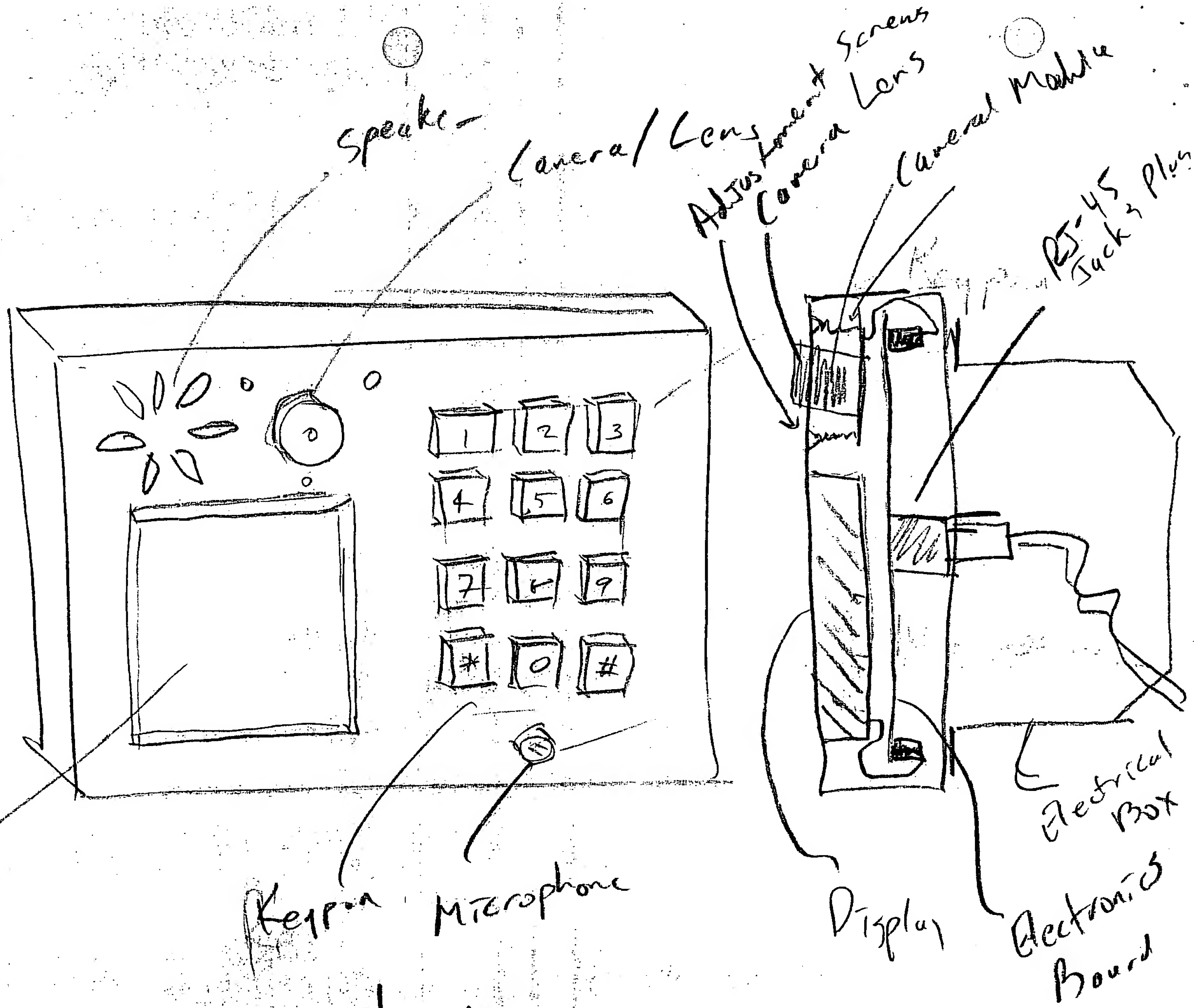


[redacted]

BASIC I/P Video Camera

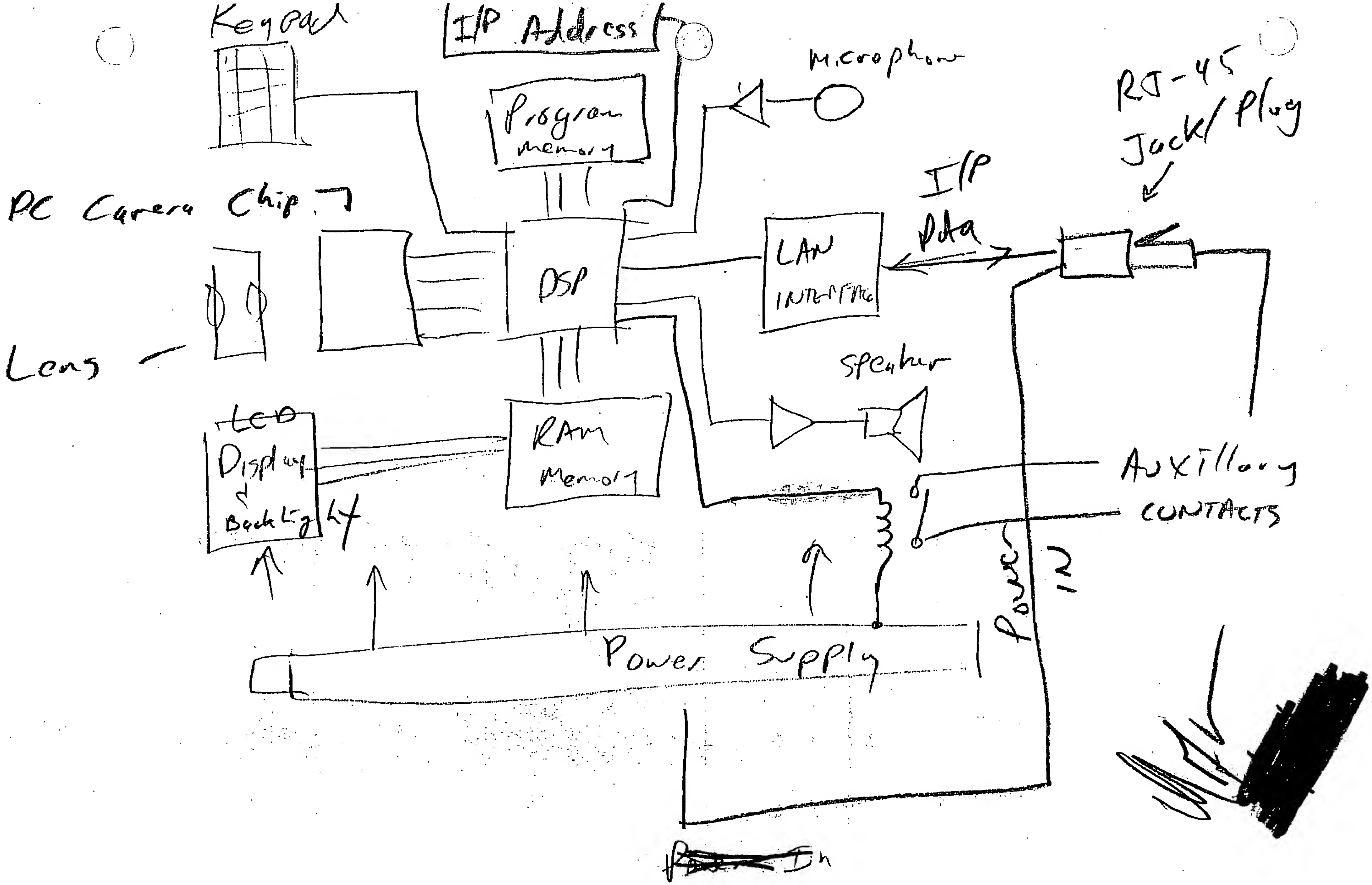
Block Diagram

[redacted]



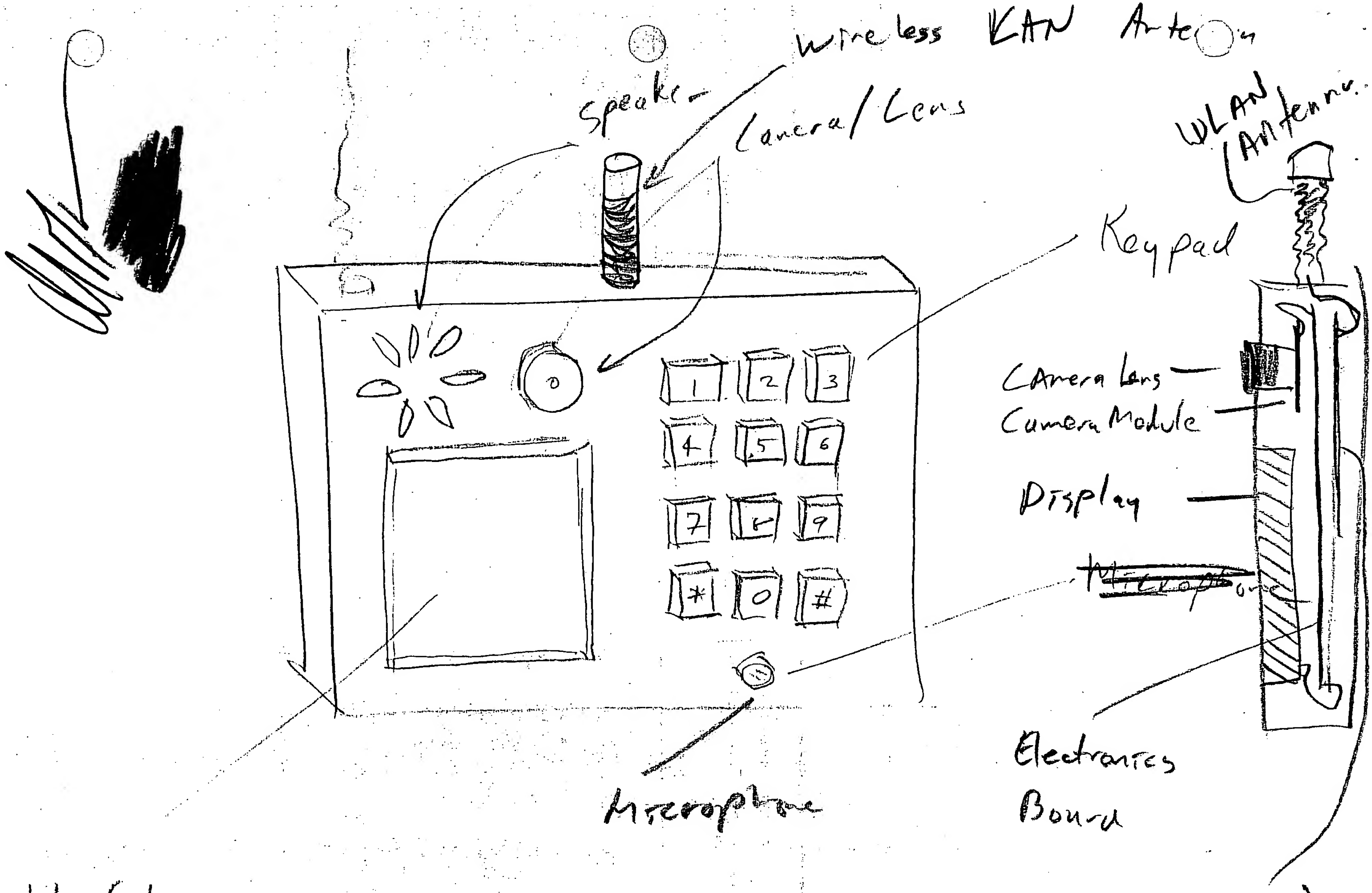
Hardwired I/P Video Intercom

Physical Illustration



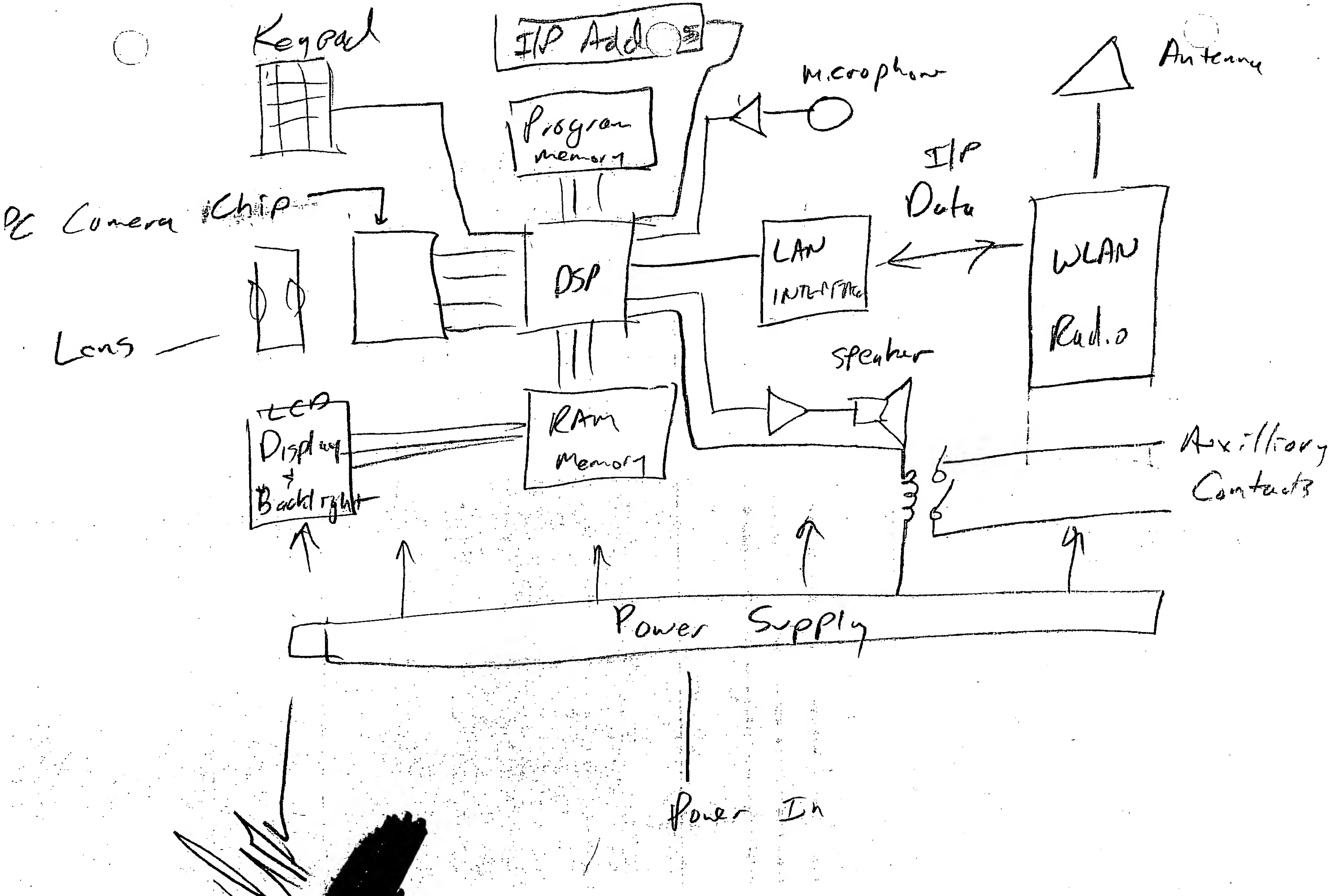
Hardwired ~~Wireless~~ I/P Video Intercom

Block Diagram



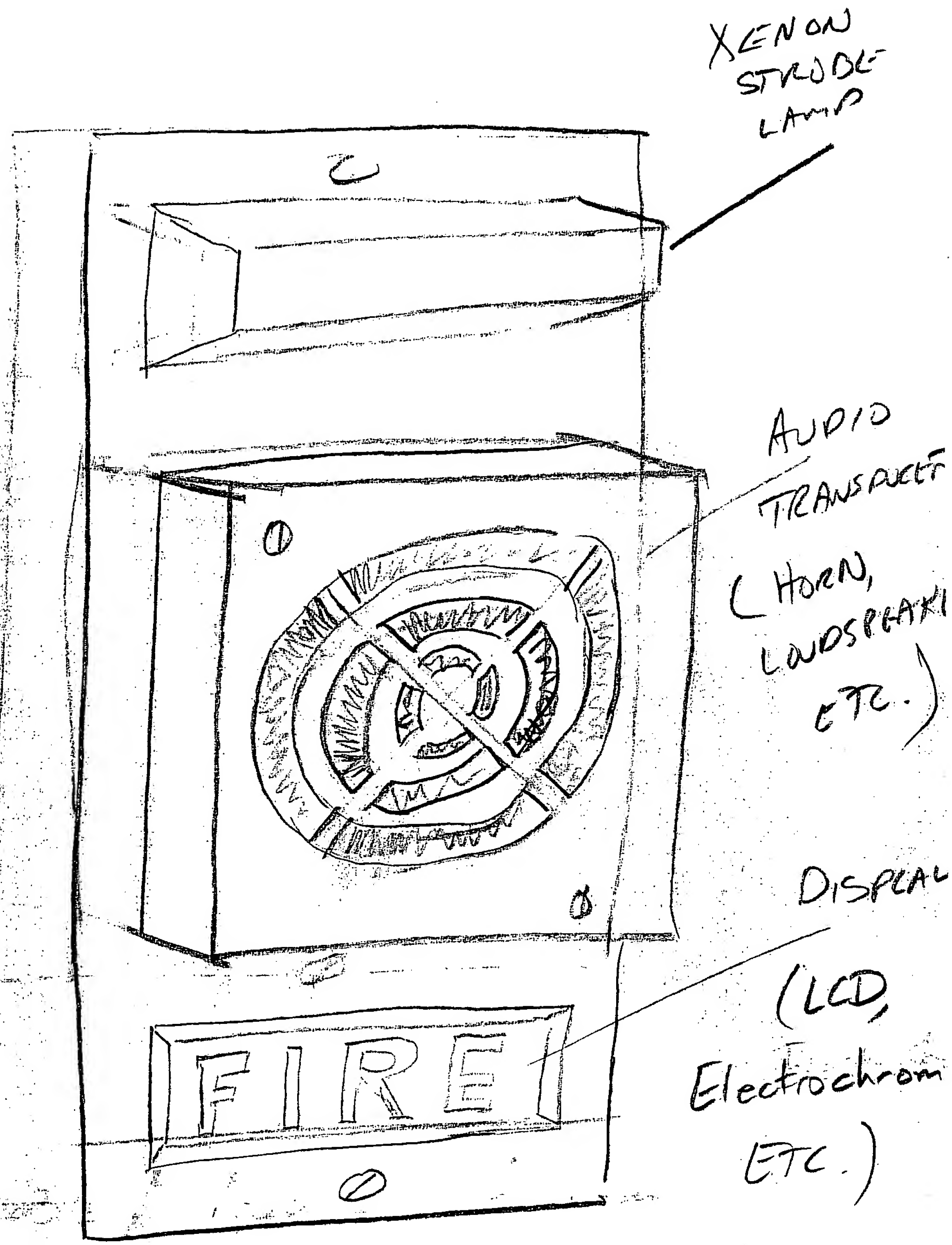
Wireless IP Video Intercom

Physical Illustration

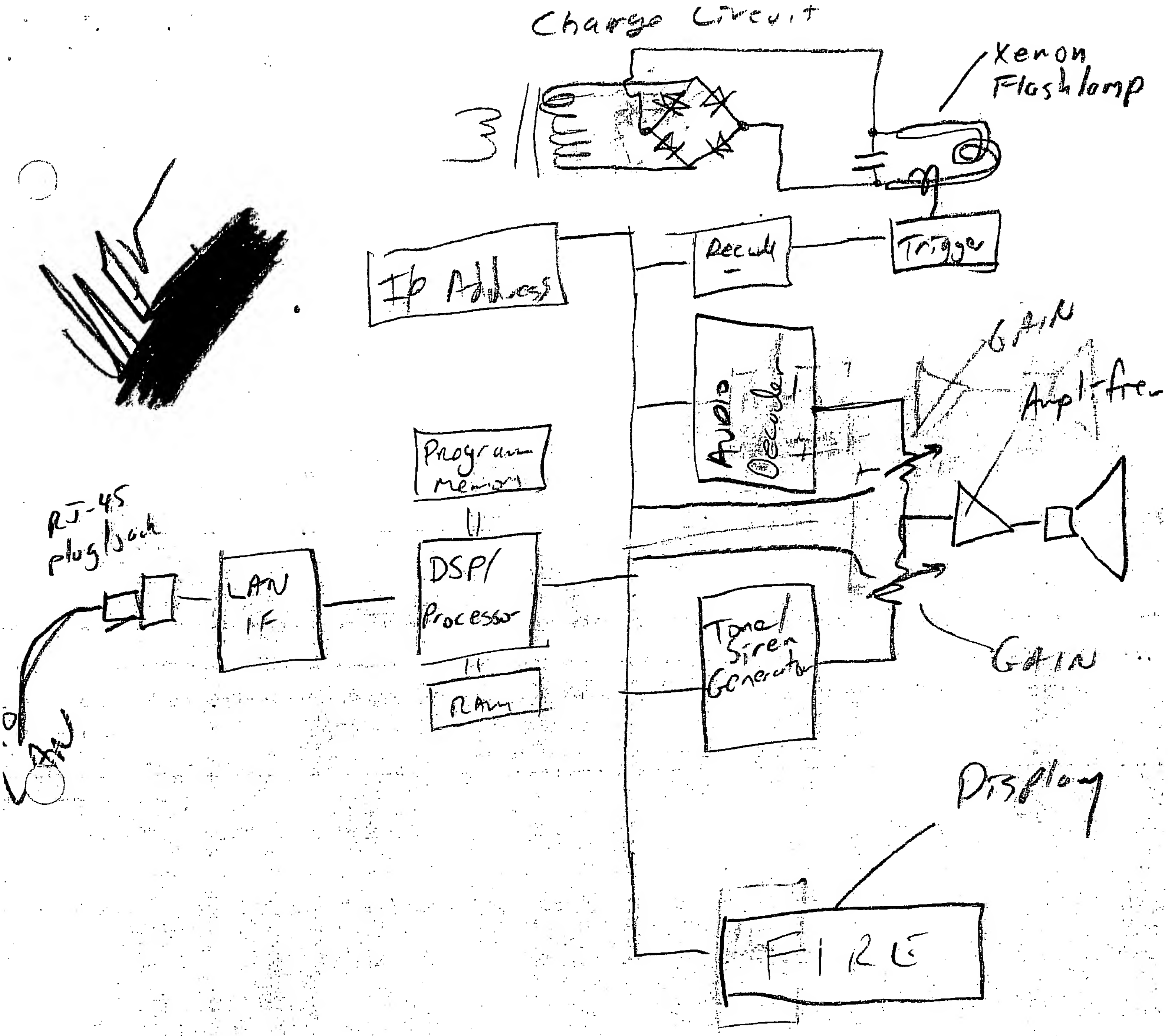


Wireless I/P Video Intercom
Block Diagram

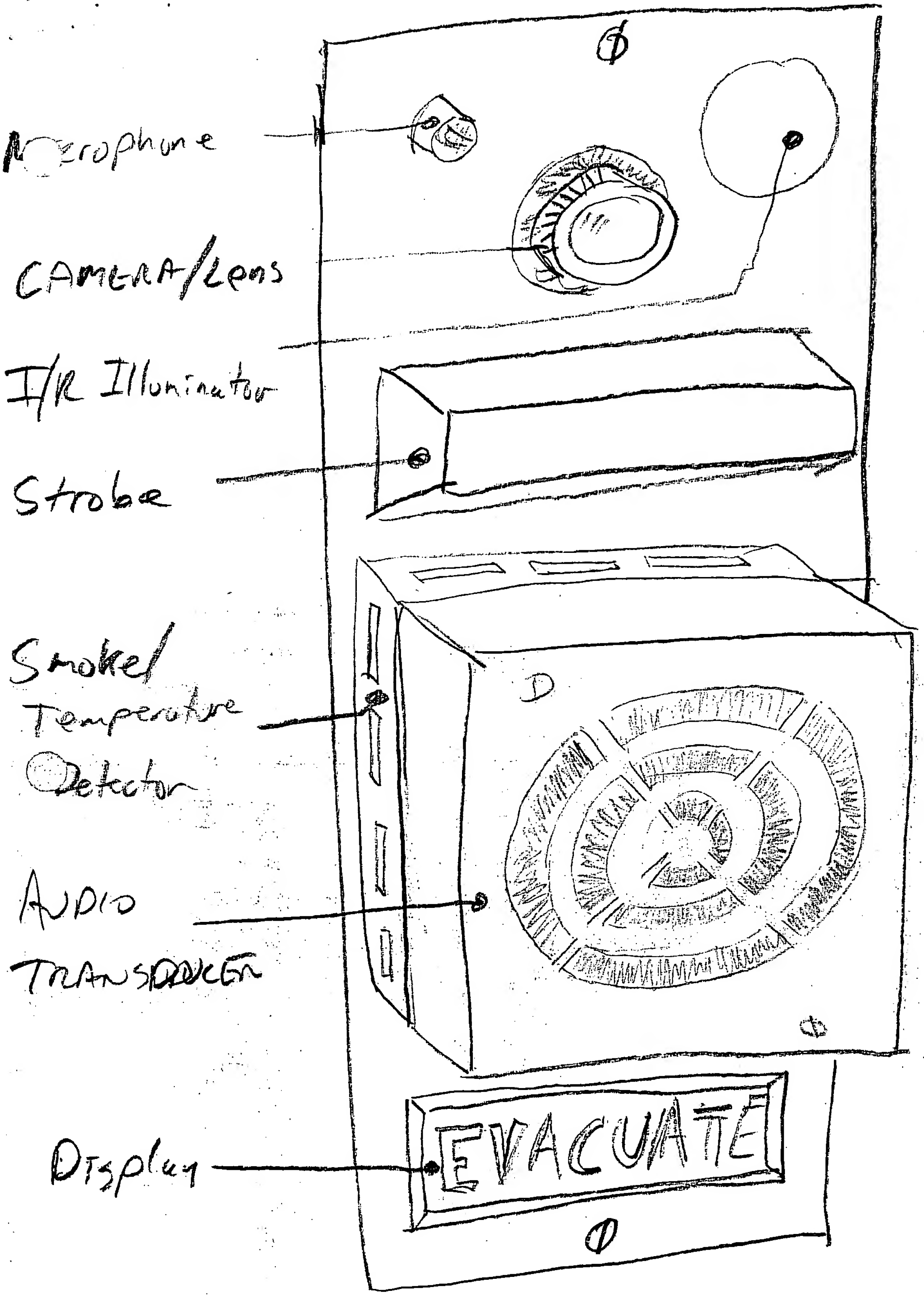
UP



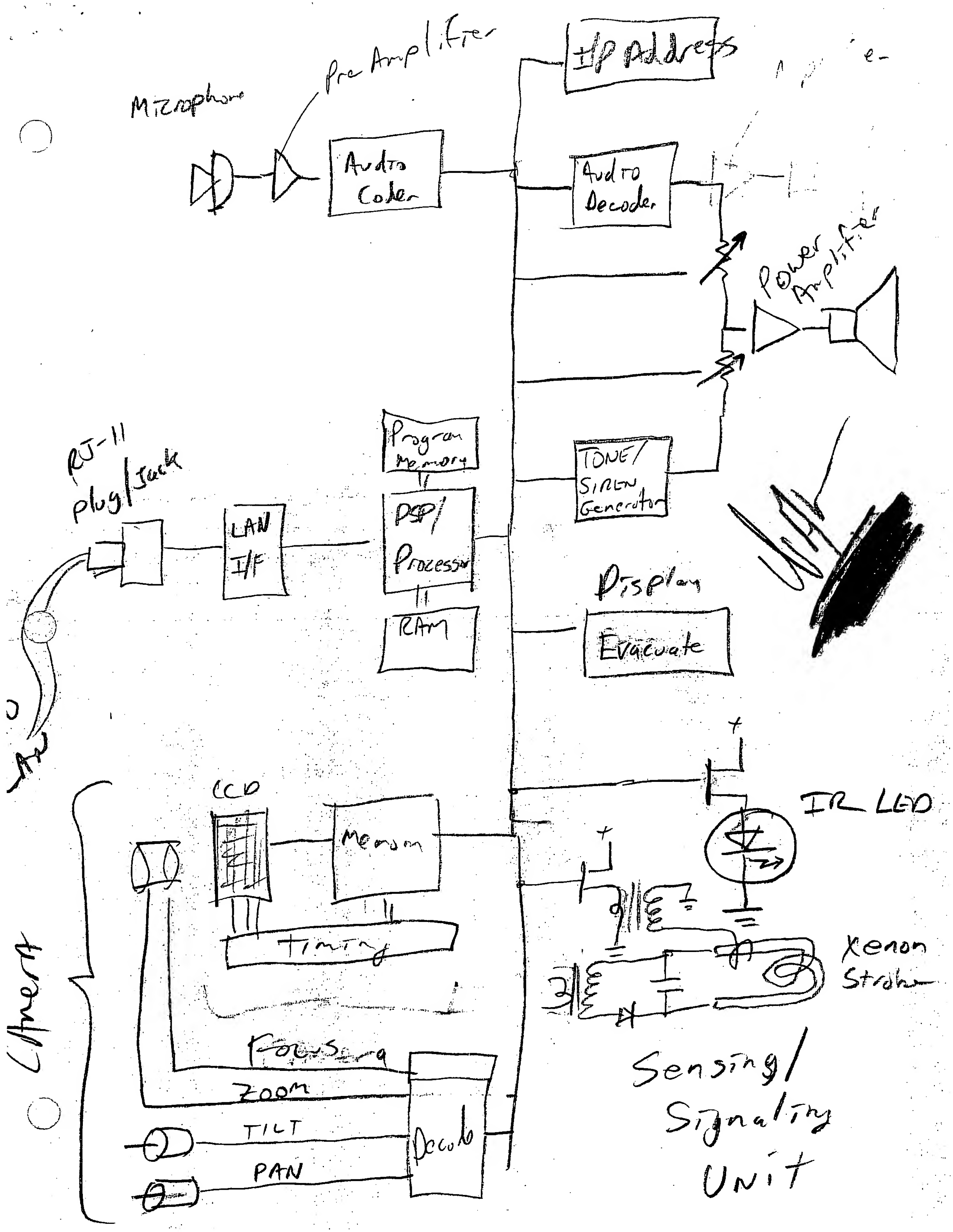
Signaling Transducer Unit



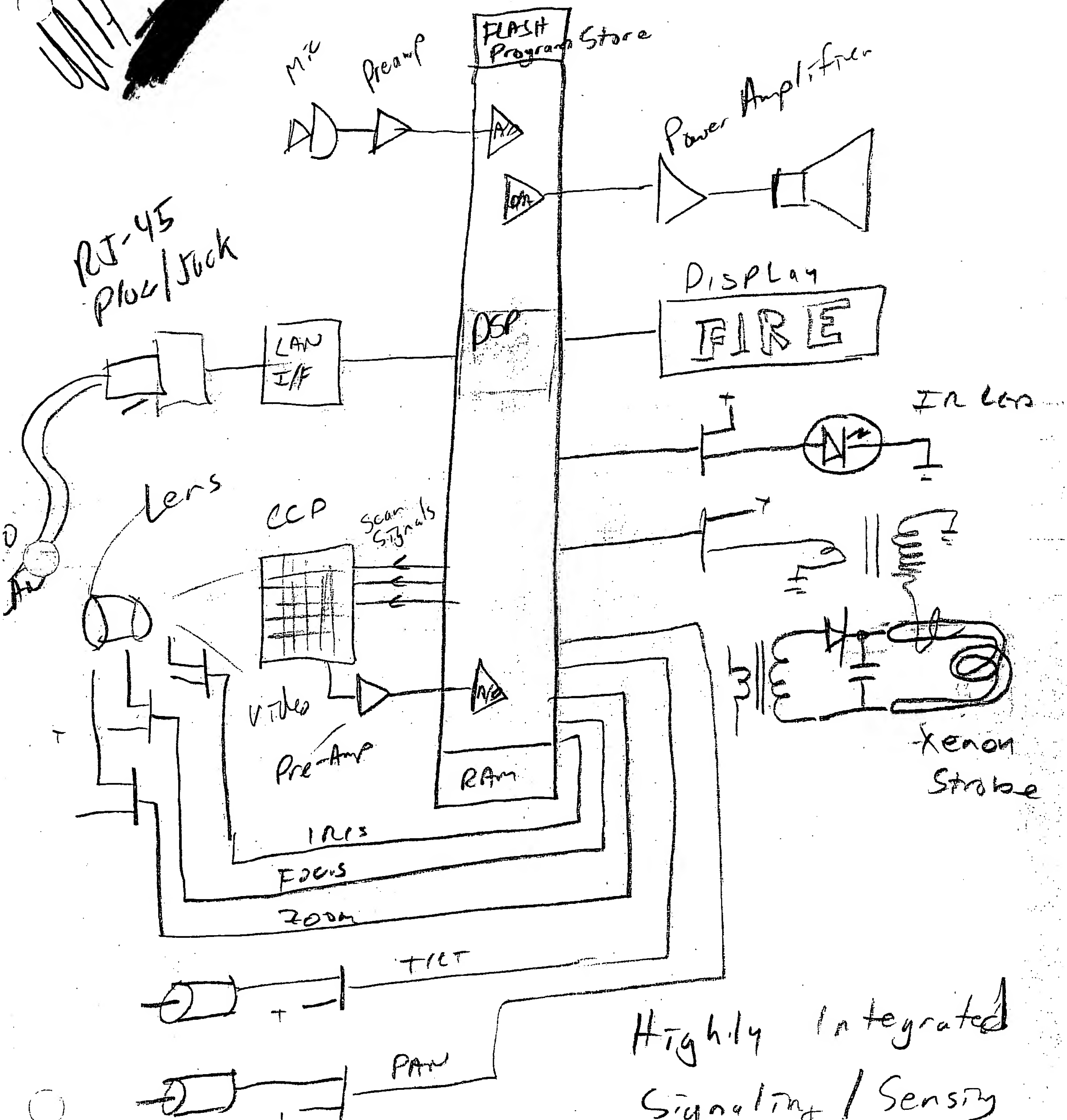
Signaling Transducer Unit



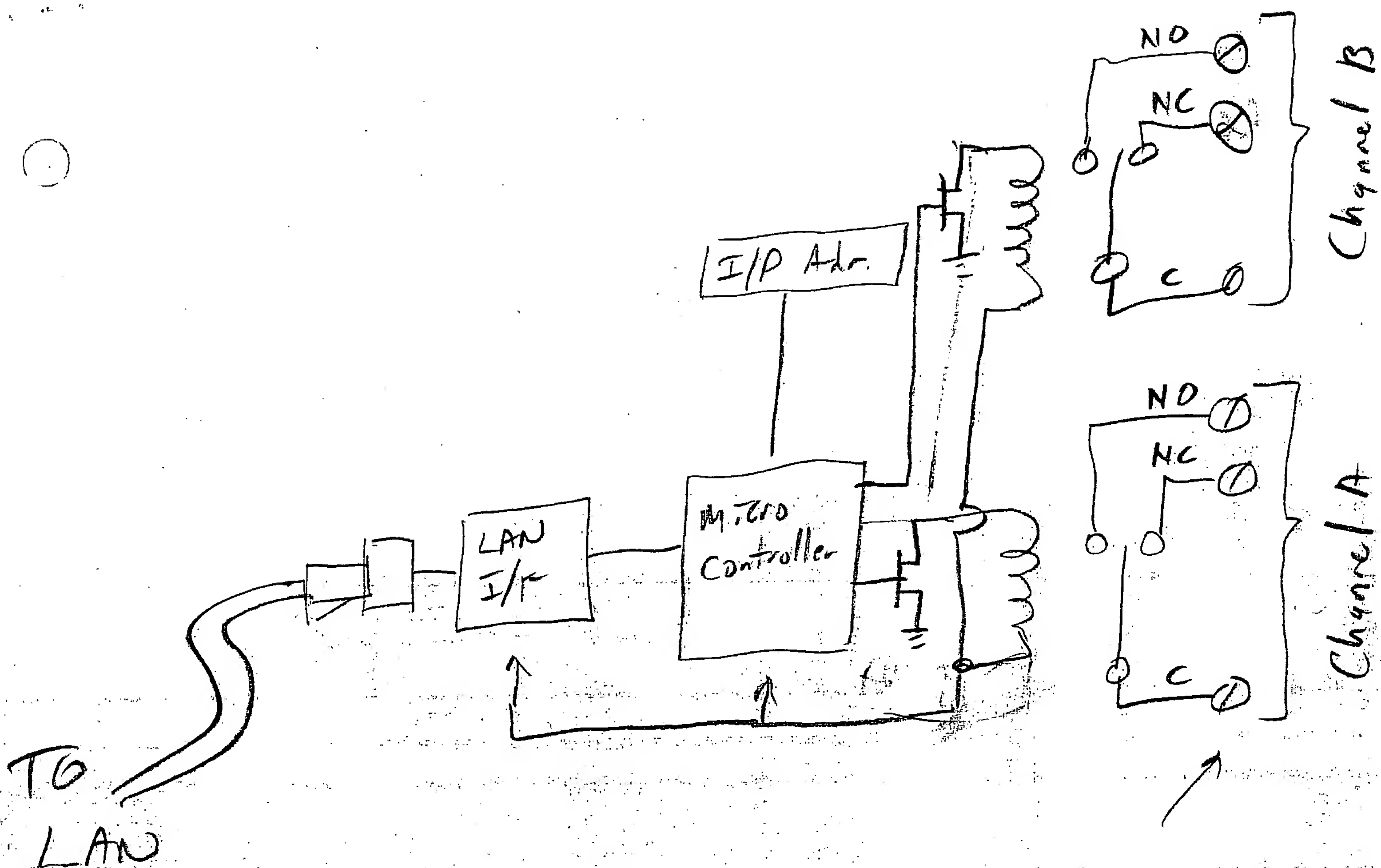
Sensing / Signaling Unit


Microphone
Pre Amplifier
Audio Coder
I/P Address
Audio Decoder
Power Amplifier
RJ-11 plug/Jack
LAN I/F
Program Memory
DSP/Processor
RAM
TONE/SIREN Generator
Display
Evacuate
CCD
Memory
Timing
IR LED
Xenon Strobe
Focus
Zoom
TILT
PAN
Decode
Camera
Sensing/Signaling Unit

[redacted]



Highly Integrated Signaling / Sensing Unit

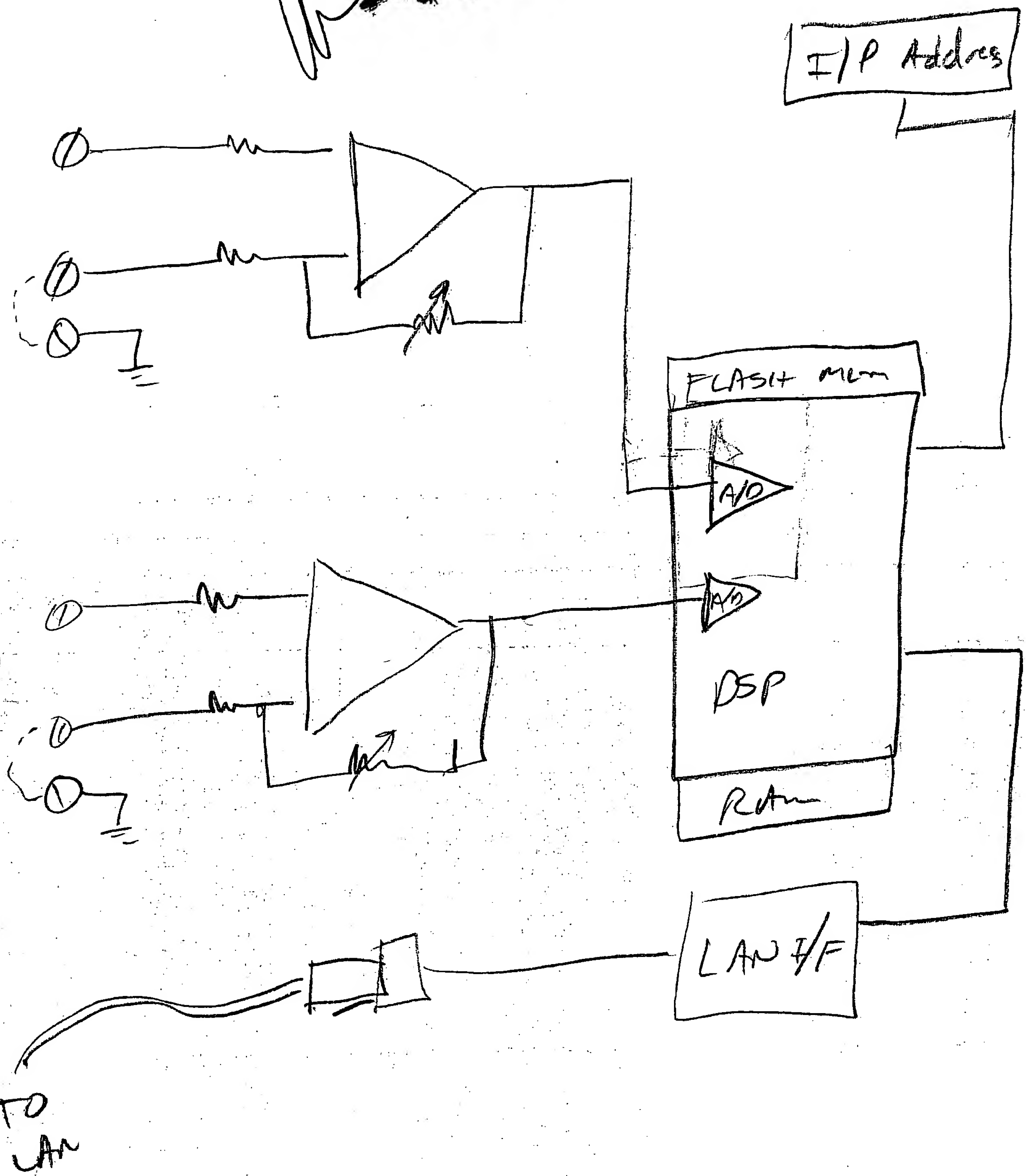


Dry Contacts for Controlling Lights/ Sirens/ Motors, Etc.

[redacted]

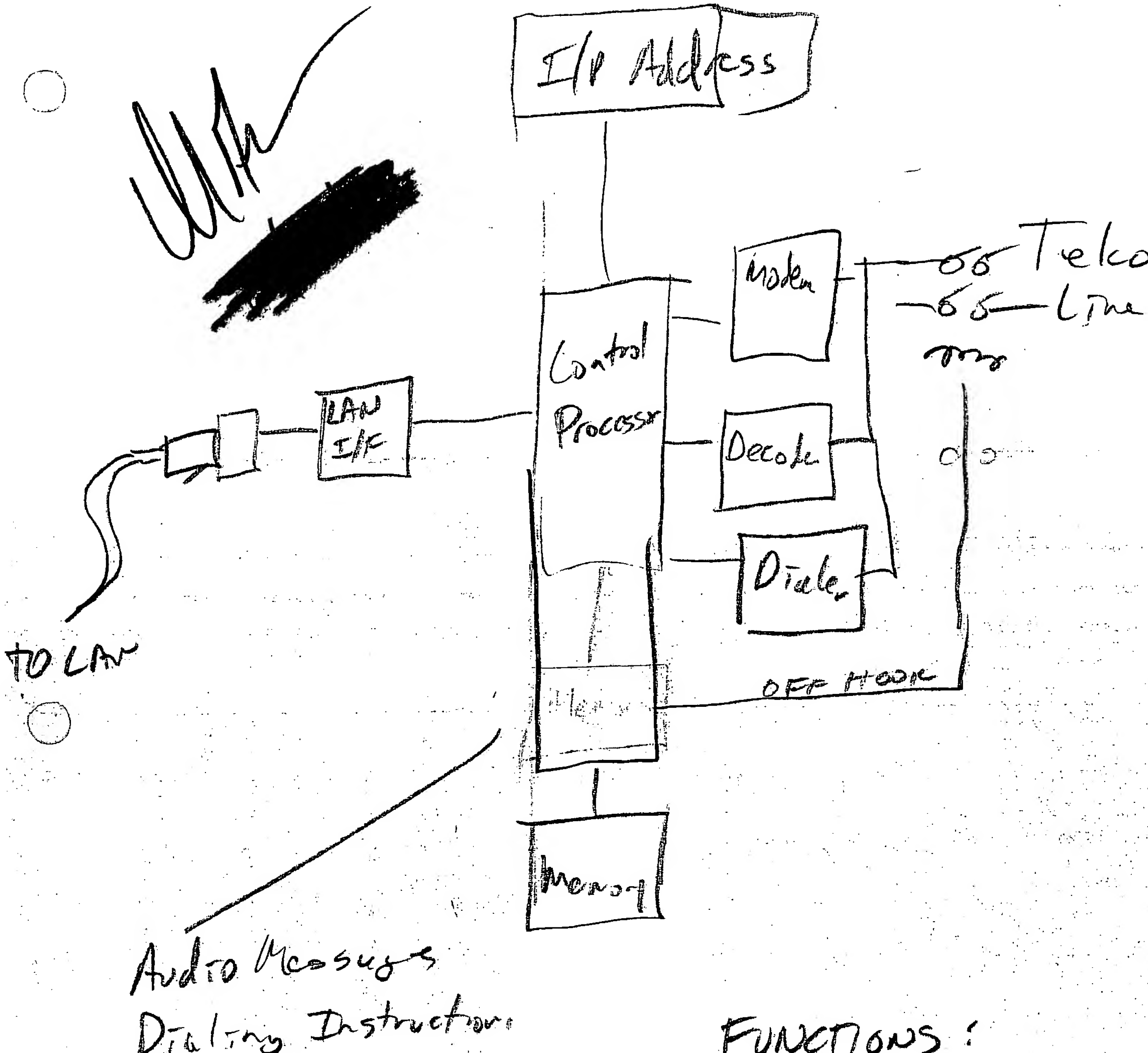
CONTACT / LAN Interface
(Two Channels Illustrated)

[redacted]



Analog Sensor /LAN interface

[redacted]



FUNCTIONS:

- Dial Alarm Monitor Co.
- Dial Personnel
- Dial Police / Fire
- Dial Pagers
- Dial Cell Phones

TELCO GATEWAY

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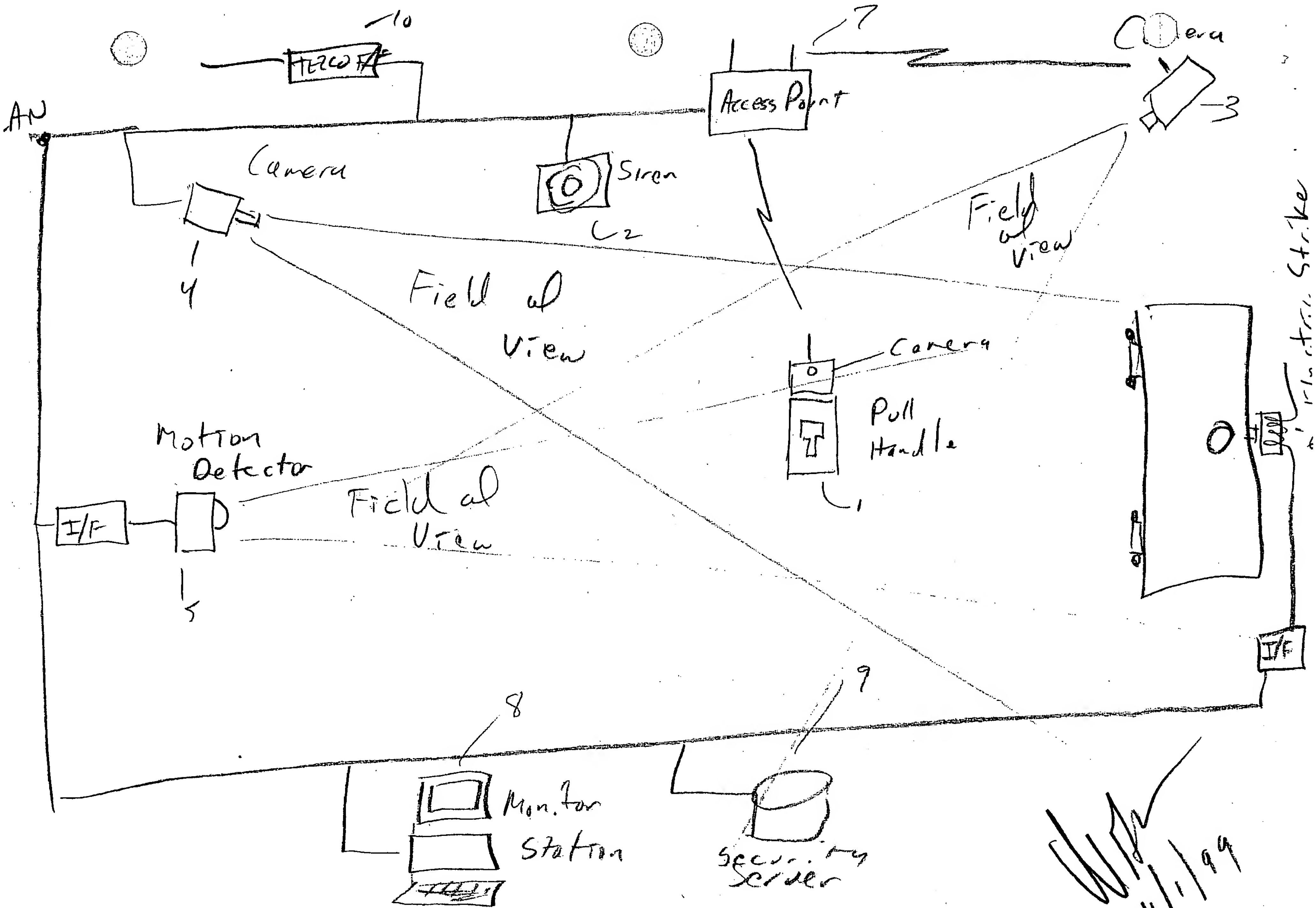

Clustered Alarm Workgroups

Description of Clustered working

- Associates Sensors with other Co-Located Sensors, Locks, Sirens, Etc.
- Associations Stored in Server - 9
- Pull Handle 1 is pulled
- Pre Event Video from 1, 3 & 4 is saved
- Recording from 1, 3 & 4 is initiated
- Streaming video sent from 1, 3 & 4 sent to monitor 8
- Alarm Sounder/Strobe 2 is Activated.

- Door 6 is unlocked
- Everything is Logged on Server 9
- Authorities contacted over teleo 10

MULTIMEDIA SURVEILLANCE AND MONITORING SYSTEM INCLUDING INTERNET CONFIGURATION

Inventor:
David A. Monroe

MULTIMEDIA SURVEILLANCE AND MONITORING SYSTEM INCLUDING INTERNET CONFIGURATION

Inventor:
David A. Monroe

BACKGROUND OF THE INVENTION

Field of the Invention. The subject invention is directed to surveillance and monitoring systems and is specifically directed to a comprehensive, hybrid multimedia surveillance system based on wireless data transmission and video streaming techniques, still image and/or step video, video streaming, audio, motion detection, event detection and/or physical condition detection using wireless communications and Internet communication techniques and methods.

Discussion of the Prior Art. Video monitoring and surveillance of locations or areas for security, safety monitoring, process control, and other such applications by use of closed circuit television and similar systems has been in widespread use for many years. The cost of these systems has come down significantly in recent years as the camera and monitor components have steady dropped in cost while increasing in quality. As a result, these systems have proliferated in their application and are proving extremely useful for both commercial and residential applications.

These "closed circuit television" systems typically consist of a monochrome or color television camera, a coaxial cable, and a corresponding monochrome or color video monitor and power sources for the cameras and monitors. The interconnection of the camera and monitor is typically accomplished by the use of coaxial cable, which is capable of carrying the 2 to 10 megahertz bandwidths of closed circuit television systems. Further, the coaxial cable is shielded for noise immunity, is relatively inexpensive and is commonly available. There are several limitations to coaxial cable supported systems. First, the signal is attenuated by the cable in

proportion to the distance traveled. Long distance video transmission on coaxial cable requires expensive transmission techniques. Second, both the cable, per se, and the installation is expensive. Both of these limitations limit the use of coaxial closed circuit systems to installations requiring less than a few thousand feet of cable. Third, when the cable cannot be concealed is not only unsightly, but is also subject to tampering and vandalism.

Other hardwired systems have been used, such as fiber optic cable and the like, but have not been widely accepted primarily due to the higher costs associated with such systems over coaxial cable. Coaxial cable, with all of its limitations, remains the system of choice to the present day. Also available are techniques using less expensive and common twisted pair cable such as that commonly used for distribution of audio signals such as in telephone or office intercom applications. This cable is often referred to as UTP (unconditioned twisted pair) or SUTP (shielded unconditioned twisted pair) cable. Both analog and digital configurations are available. Both analog and digital techniques have been implemented. This general style of twisted pair cable is also widely used in Local Area Networks, or LAN's, such as the 10Base-T Ethernet system, 100 Base-T and later systems. Newer types of twisted pair cable have bee developed that have lower capacitance and more consistent impedance than the early telephone wire. These newer types of cable, such as "Category 5" wire, are better suited for higher bandwidth signal transmission and are acceptable for closed circuit video applications. By way of example, typical audio signal are approximately 3 kilohertz in bandwidth, whereas typical video signals are 3 megahertz in bandwidth or more. Even with the increased bandwidth capability of this twisted pair cable, the video signals can typically be distributed directly over twisted pair cable only a few hundred feet. In order to distribute video over greater distances, video modems (modulator/demodulators) are inserted between the camera and the twisted pair wiring and again

between the twisted pair wiring and the monitor. Twisted pair cable is lower in cost than coaxial cable, is easer to install than coaxial cable and, like coaxial cable, is readily available.

Wireless systems utilizing RF energy are also available. Such systems usually consist of a low power UHF transmitter and antenna system compatible with standard television monitors or receivers tuned to unused UHF channels. The FCC allows use of this type of system without a license for very low power levels in the range of tens of milliwatts. This type of system provides an economical link but does not provide transmission over significant distances due to the power constraints placed on the system. The advantage of this system over hardwired systems is primarily the ease of installation. However, the cost is usually much higher per unit, the number of channels is limited and system performance can be greatly affected by building geometry or nearby electrical interference. Further, the video is not as secure as hardwired systems. The may be picked up by anyone having access to the channel while in range of the transmitter and is thus, easily detected and/or jammed.

Because of the inherent limitations in the various closed circuit television systems now available, other media has been employed to perform security monitoring over wider areas. This is done with the use of CODECs (coder/decoders) used to reduce the bandwidth. Examples include standard voice bandwidth telephone circuits, more sophisticated digital telephonic circuits such as frame relay or ISDN circuits and the like. While commonly available and relatively low in cost, each of these systems is of narrow bandwidth and incapable of carrying "raw" video data such as that produced by a full motion video camera, using rudimentary compression schemes to reduce the amount of data transmitted. As previously discussed, full motion video is typically 3 to 7 megahertz in bandwidth while typical low cost voice of data circuits are 3 kilohertz in bandwidth.

There are known techniques for facilitating full motion video over lower bandwidth circuits. The video teleconferencing (VTC) standards currently in use are: Narrow Band VTC (H.320); Low Bitrate (H.324); ISO-Ethernet (H.322); Ehternet VTC (H.323): ATM VTC (H.321); High Resolution ATM VTC (H.310). Each of these standards has certain advantages and disadvantages depending upon the volume of data, required resolution and costs targets for the system. These are commonly used for video teleconferencing and are being performed at typical rates of 128K, 256K, 384K or 1.544M bit for industrial/commercial use. Internet teleconferencing traditionally is at much lower rates and at a correspondingly lower quality. Internet VTC may be accomplished at 33.3KBPS for example. Video teleconferencing is based on video compression, such as the techniques set forth by CCITT/ISO standards, Internet standards, Proprietary standards or by MPEG current standards. A discussion of these standards may be found at the web site "*http://cuiwww.unige.ch/OSG/info/MultimediaInfo/mmsurvey/standards.html*". Other, sometimes proprietary, schemes using wavelet or motion JPEG compression techniques and the like are also in existence. There are a number of video teleconferencing and video telephone products available for transmitting "full motion" (near real-time) video over these circuits such as, by way of example, systems available from AT&T and Panasonic. While such devices are useful for their intended purpose, they typically are limited in the amount of data which may be accumulated and/or transmitted because they do not rely on or have limited compression, and, therefore, are time consuming and require large capacity in order to manage a small amount of information, particularly if such information is to be archived. There are also devices that transmit "live" or in near real-time over the Internet, such as QuickCam2 from Connectix, and more recently, CU-See-Me and Intel products utilizing the parallel printer port, USB port, ISA, PCI card, or

PC/MCIA card on a laptop computer. Many of these are public access systems and have neither the resolution required or the security required to provide for good surveillance systems. NetMeeting from Microsoft and Proshare software packages form Intel also provide low quality personal image distribution over the Internet.

All of the current Internet low cost products have the ability to transmit motion or "live" video. However, such products are limited or difficult, if not impossible, to use for security applications because the resolution of the compressed motion video is necessarily low because of limited original resolution of the sample and the applications of significant levels of video compression to allow use of the low bandwidth circuits. The low resolution of these images will not allow positive identification of persons at any suitable distance form the camera for example. The low resolution would not allow the reading of an automobile tag in another example.

In many security applications it is desirable to monitor an area or a situation from a monitor located many miles from the area to be surveyed. As stated, none of the prior art systems readily accommodates this. Wide band common carriers such as are used in the broadcast of high quality television signals could be used, but the cost of these long distance microwave, fiber or satellite circuits is prohibitive.

SUMMARY OF THE INVENTION

The subject invention is directed to a comprehensive, wireless multimedia surveillance and monitoring system which is adapted for transmitting event data, video and/or image monitoring information, audio signals and other sensor and detector data over significant distances using digital data transmission over a wireless LAN (WLAN), Intranet or Internet for automatic assessment and response including dispatch of response personnel. Both wired and wireless sensor systems may be employed. GPS dispatching is used to locate and alert personnel as well as to

indicate the location of one or more events. Automatic mapping, dispatch and response vectoring permits rapid response. The wireless LAN connectivity permits local distribution of audio, video and image data with relatively high bandwidth without requirement of a license and without relying on a common carrier and the fees associated therewith. The surveillance system may be interfaced with a WAN (wide area network) or the Internet for providing a worldwide, low cost surveillance system with virtually unlimited geographic application. Centralized monitoring stations have access to all of the surveillance data from various remote locations via the Internet or the WAN. A server provides a centralized location for data collection, alarm detection and processing, access control, auto response generation, paging, automatic e-mail generation, telephone dialing and message transmission, dispatch processing, logging functions, configuration management, and/or other specialized functions. The server may be inserted virtually anywhere in the Intranet/Internet network. The topology of the network will be established by the geographic situation of the specific installation. Appropriate firewalls may be set up as desired to protect unauthorized access to the system or collected data. The server based system permits a security provider to have access to the sensor and surveillance data or to configure or reconfigure the system from any station on the intranet or Internet.

The system of the subject invention permits monitoring of locations over great distances with sufficient resolution to provide widespread use as a security surveillance device. Suitable configurations of basic electronics for supporting this system are shown and described in my co-pending applications, as follows: MICRORIT I, MICRORIT II, FAXCAM RJ-11and GROUND BASED SECURITY AND WIRELESS AIRCRAFT SECURITY. All of these applications are fully incorporated herein by reference. The subject invention is specifically directed to a system that can transmit essential information for surveying and monitoring a selected zone or area. The

system includes video and/or image sensors as well as audio, condition and/or event monitoring systems. In its preferred form, the comprehensive multi-media safety and surveillance system of the subject invention provides both visual and audio information as well as critical data such as fire and smoke detection. Manually operated transducers, such as panic buttons, door contacts, floor sensors, and the like may also be included to activate the system in the presence of an event at the sensor location, such as a fire alarm or security alarm or the like. In my aforementioned copending applications, incorporated herein by reference, detection and sensor systems are utilized to provide monitoring stations or personnel, such as security personnel, and/or a base monitoring station critical information from the sensor system and to record the information and permit reconstruction of events after the fact. The system of the subject invention permits detection of unexpected events, breach of security, and other activities in the vicinity of any sensor within the system and identifies the time and location of the event for permitting an appropriate response. A GPS system may be included to provide accurate positioning information of both the sensors and roving or mobile response units such as security personnel. Steerable video cameras may be incorporated in order to monitor movements in the range of the sensors. The cameras may be activated and directed based on the location data provided by the integral GPS system. It is also desirable to include focusing and timing functions so that selective sequencing, zoom and axial (x,y,z) positioning can be utilized.

In its preferred form, a plurality of sensor units, which may include at least one video image sensor/device and/or at least one audio sensor and/or at least one motion sensor, are placed strategically about the facility to be monitored. In addition, strategically placed motion detectors, fire sensors, panic switches, smoke sensors and other monitoring equipment are incorporated in the system. Cameras may be placed throughout the facility and in other desired spaces including

on the ground outside the facility. The audio sensors/transducers and other sensors and detectors are also strategically located both internal and external of the facility.

While the system may be hardwired, in its preferred for the system of the present invention is adapted for use in connection with wireless transmission and receiving systems. The wireless system is particularly useful for adapting the system as a retrofit in existing facilities and also provides assurances against disruption of data transmission. In the preferred embodiment, the wireless system is fully self-contained with each sensor unit having an independent power supply and, where required for image sensors, a sensor light source. The security system may include either motion sensitive, audio sensitive and/or image processing based activation systems so that the equipment is not activated until some event is detected, i.e., the system is action triggered.

In the preferred embodiment, the system will transmit any detected information to a monitor system located at a base monitoring station, located on site and/or at a remote location, and/or a server for logging, forwarding, archiving same. The base station has instant live access to all of the image and audio signals as they are captured by the sensors, and where desired is adapted to record and make an historic record of the images for archive purposes. Where random access recording techniques are used, such as, by way of example, digital random access memory storage devices, the information by be readily searched for stored information.

If unauthorized personnel breaches the security area and the audio and video equipment is activated, signals will be immediately transmitted to the base station, usually with an alert signal to attract the attention of base personnel. This will give immediate access to information identifying the activity, the location and the personnel involved. Further, in the preferred embodiment of the invention, an appropriate response system will be activated for securing the immediate area and taking counter measures to protect the security of the area. This may include

dispatch of personnel, sealing off the area, and/or, where appropriate, transmitting an audible and/or visual alarm as well as instructions.

In the preferred embodiment, when a large number of sensors are utilized in a complex system, the plurality of sensors may be synchronized through an integral multiplexing system whereby the plurality of data, including visual image data, may be displayed, recorded, and/or transmitted in either a split screen or serial fashion. A time or chronology signal may also be incorporated in the data scheme, whereby all collected real time streaming media on individual events are time stamped for exact time and date. Any signal which is capable of being captured and stored may be monitored in this manner.

Utilizing the wireless system of the invention in combination with the battery back-up power supply, it is possible to continue collecting information without using a central or public power source. This assures that the system will operate even if power is disrupted for any reason such as, by way of example, tampering by unauthorized personnel. The sensors can detect power outages and generat alarm conditions as reported over the LAN or WLAN. In its simplest form, only triggered sensors are active, and only the signals generated thereby are transmitted to the security station. In the preferred embodiment, a combination of hardwired and wireless devices and components will be used. One advantage to use of certain wireless components is that the capture, retrieval, monitor and archive system utilizing a wireless transmitting/receiving system assures that transmission will not be lost in wires in a portion of the system are cut or otherwise interrupted, during a fire or an earthquake, for example. Wireless configurations are also particularly desirable for retrofit installations where it may be difficult to install cable. Further, in addition to ease of installation, wireless components are virtually portable and can be re-deployed based on history of need within a given installation simply by moving the component

to a new location. In the preferred embodiment, components of such a system would be completely self-contained with an integrated power supply and, as required for image sensors, an integrated illumination system. The illumination system would provide lighting to permit capture of images in the event the public power system fails.

Of course, it is an important aspect of the invention that all of the collected data, including any video images, be recorded to provide an historic video record. This will prove invaluable as an aid in reconstructing the events in a "post mortem" investigation.

The system of the present invention is capable of transmitting the collected information over significant distances using typical voice bandwidth carriers in sufficient resolution to accommodate security surveillance and other high resolution applications. In one embodiment, one or more wireless cameras or sensor devices are in communication with a local Intranet system using a wireless LAN (local area network) connection. A monitoring station is also in communication with the Intranet at any desired location on the LAN. The monitoring station can monitor audio and/or video and/or image data and/or sensor data continuously, periodically as programmed, or upon event detection such as by motion detection, contact closure or detection by an independent system that is in communication with the surveillance system. The wireless LAN connectivity permits local distribution of audio, video and/or image data over a relatively high bandwidth without requirement of a license and without relying on a common carrier and the fees associated therewith.

Where longer distance transmission is required, the surveillance system of the subject invention may be interfaced with a WAN (wide area network) or the Internet. This provides a worldwide, low cost surveillance system with virtually unlimited geographic application. Such a system is very useful in applications where multiple buildings are part of the surveillance

network, such as, by way of example, a college campus, school builings or distircts, or corporate campus or a government installation. Centralized monitoring stations can then have access to all of the surveillance data from various remote locations via the Internet or the WAN.

In an enhancement of the invention, a security server is added to the system for expanding and enhancing the capability and functionality of the surveillance system. The server provides a centralized location for data collection, alarm detection and/or processing, access control, dispatch processing, logging functions, data mining capability, configuration and management functions, map serving, and other specialized functions. The sever may be inserted virtually anywhere in the Intranet/Internet network as it may be accessed universally. The topology of the network will be established by the geographic situation of the installation. Multiple servers may be employed. The server permits the implementation of standard Internet tools and techniques such as TCP/IP, HTML and browser support that will allow nearly universal access to the system with proper security access codes. Appropriate access controls and firewalls may be set up as desired. The server based system permits a security provider to have access to the sensor and surveillance data and/or to configure or reconfigure the system from any station on the Internet, such as from a PC at home. The system supports and manages the collection, logging and archiving of data; data mining; the monitoring, assessment, response and dispatching of alarm conditions; data distribution to remote locations; routing; data format conversion as necessary; and signals the dispatch of response support where required.

An example of a multiple location, server based, Internet support system in accordance with the subject invention is a typical school district. Using the subject invention, wireless sensors may be located in strategic areas in each school building or on each campus of a district. A wireless receiver (or multiple receivers) is then connected to the local area network on the campus

and a monitor station is placed at a strategic location, for example, in the administration office. The collected data may be displayed on a PC monitor or other monitor such as a CRT console monitor or an LCD, personal communications devices, and/or any of a variety of suitable monitors and display units. In addition, the data is sent via the Intranet or Internet to a server located, for example, at the district office, where all campuses are monitored. The server can also distribute and dispatch information upon the occurrence of an event. For example, if a panic button were to be activated at a sensor station, this signal would be immediately transmitted, assessed and a response initiated. If the panic button indicated a fire, a fire response team would be dispatched directly to the scene, as well as other appropriate responsive actions. In a worst case example, if a gun shot were detected, using acoustic the server would be able to identify the sensor on the specific campus where the event occurred and then send the information to appropriate authorities such as, by way of example, on site roving guards, the closest police station and the closest fire station, providing a fast response after the occurrence of the event. The wireless nature of the sensors also minimizes the likelihood of tampering with the signals. The multiple communication paths provide redundancy in the system making it unlikely that all monitoring stations would be down at one time. The system is a cost-effective, flexible and comprehensive system for enhancing the campus and building security issues currently facing most institutions and organizations.

One significant advantage to the system of the subject invention is that it accommodates multimedia surveillance in applications and locations where physical wiring cannot be used and over distances not possible with other systems. The system of the present invention provides surveillance capability utilizing techniques ranging from closed-circuit, hard wired systems to the

Internet and is not dependent upon the limitation of data capability; distance attenuation and costs associated with systems currently on the market.

It is an important feature of the invention that it is adapted to the use of non-localized wireless carrier links. WLAN systems are generally restricted to distances ranging from 200 to 4000 feet. Greater distances can use common carriers for transmitting the data. CDPD data service, Internet two-way pager service or an Internet satellite service and the like can be used. Even carriers generally not including an Internet gateway can be used if modified to provide an access path to the server or to the Internet gateway. For example, conventional (non-digital) cellular service can be provided with an ISP connection to provide a gateway to the Internet. This would permit a remote unit at a location such as at a distant soccer field or the like to be in contact while on rounds. Type of event, location and multimedia data can be dispatched to the mobile unit for initiating immediate action.

The server is the heart of the surveillance system an monitors the status of the wired and/or wireless sensors as well as the status of the monitor stations anywhere on the system. The sever monitors event detection and both manages and monitors response dispatch. The server also manages the collection, dissemination, logging and/or archiving of data. The server manages, monitors, configures and reconfigures the system components. This can be done seamlessly from a remote location, eliminating the requirement that personnel attend to each station except when hardware upgrades are required.

The server supported system permits a broad range of signal and event processing. For example, the server can arm and disarm sensors for detection of external events, audio detection or video detection based on predetermined schedules or manual control via Internet or Intranet

access. If an activated sensor is triggered, the server can dispatch alarm conditions in several ways, including by not limited to sending:

- messages to specifically assigned monitoring stations or mobile units;
- a telephone call to a designated land line (such as 911) with an audio message describing the event.
- a telephone call to a designated wireless telephone number with an audio message describing the event in order to dispatch a mobile unit;
- a numeric pager message with transmitted number signifying a voice mailbox;
- a voice pager with audio message;
- a text page describing the event;
- a text message to wireless personal data assistant (PDA);
- e-mail to specific addresses;
- graphic information showing, for example, a map of the event location to PDA .

The server based system can be used to notify multiple parties, or can notify and wait for a confirmation and then perform programmed sequenced steps based on response of the notified stations. Complex alert "decision tree" sequences can be implemented for personnel notification in any desirable hierarchy.

The multimedia surveillance system of the subject invention permits high resolution still image transmission as well as full motion monitoring and, where higher resolution is required, step video. All three types of data may be delivered in combination to maximize the quality of the data collected.

It is, therefore, an object and feature of the subject invention to provide a wireless communication link between sensors and/or monitors.

It is another object and feature of the subject invention to provide a multimedia surveillance system for transmitting video and image data over significant distances using typical voice bandwidth carriers such as the public telephone system, and wireless carriers such as cellular telephones, including AMPS, PCS, GSM and the like, CDPD data links, two-way pagers, Iridium satellites and the like.

It is also an object and feature of the subject invention to provide a multimedia surveillance system adapted for utilizing wireless video and/or image data collection and/or transmission using the Internet and/or IP protocols.

It is also an object and feature of the subject invention to utilize Intranet and Internet communication systems to distribute surveillance data and control data.

It is another object and feature of the subject invention to provide a security surveillance system adapted for use in connection with a wireless LAN (WLAN) communications system.

It is also an object and feature of the subject invention to provide a multimedia surveillance system adapted for making a permanent record of collected data in desired sequence and format such as before, during and after event detection, through programmed monitoring, event response and human control and intervention.

It is a further object and feature of the invention to provide mapping and other graphic information based on event detection and location data.

It is yet another object and feature of the invention to provide vectoring capability for guiding response personnel to specific locations in response to events and for guiding non-responding or at risk personnel away from such events.

It is a further object and feature of the invention to provide remote management and configuration capability of a multimedia surveillance system.

It is a further object and feature of the invention to provide a server supported multimedia surveillance system having an Intranet and Internet compatible server for data retention, alarm processing, configuration management, access control, access logging, "crosspoint switching" of data, motion detection, scene analysis, scheduled activation and deactivation detection, display data distribution and sequencing and general control and management

It is a further object and feature of this invention to provide a comprehensive, multi-media surveillance and security system for monitoring one or more selected zones form a remote location.

It is also an object and feature of the subject invention to provide communications between the monitored zone and a surveillance station using wireless communication techniques.

It is another object and feature of the subject invention to provide a comprehensive, multi-media data generating, collecting, displaying, transmitting, receiving and storage safety and surveillance scheme for security and surveillance.

It is an additional object and feature of the subject invention to provide a video and/or audio and/or data record of events occurring for archival and retrieval purposes.

It is yet another object and feature of the subject invention to provide apparatus for permitting security personnel to receive video images, audio information and data relating to critical components and areas.

It is an additional object and feature of the subject invention to provide interspersed full motion and still video for image surveillance.

It is also an object and feature of the invention to provide location information of both the personnel and the event in order to dispatch appropriate response personnel in closest proximity of the event.

Other objects and features will be readily apparent from the accompanying drawings and detailed description of the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1-7, 14a-f, and A are directed to various system configurations, as follows:

Fig. 1 is a diagrammatic illustration of a wireless system connected to an Intranet.

Fig. 2 is a diagrammatic illustration of the system of Fig. 1 further connected to a remote station via the Internet.

Fig. 3 illustrates a wireless LAN configuration and includes a system server.

Fig. 4 illustrates a server based system using Internet communications.

Fig. 5 illustrates various wireless carrier communication link configurations with gateway.

Fig. 6 is an expansion of Fig. 5 and includes wireless carrier links to monitors via wireless carrier and the Internet.

Fig. 7 is a comprehensive multimedia surveillance system incorporating the features illustrated in Figs. 5 and 6 with multiple, potentially different, wireless carriers.

Figs.14a, 14b and 14c are illustrations of various system configurations for LAN systems.

Figs. 14d, 14e and 14f are illustrations of various system configurations for wireless local area network (W-LAN) systems.

Fig. A is an illustration of a system configuration combining wired and wireless components with wired and wireless gateways to a common carrier and the Internet.

[Fig. 15 is to be deleted].

Figs. B, C, 18, D-P, 9, 10, 11, 12, 13, 16a-c, and 17 are directed to sensor and component (appliance) configurations, as follows:

Fig. B is an illustration of a hardwired IP fire alarm multimedia station.

Fig. C is a wireless configuration of the unit shown in Fig. B.

Fig. 18 is a perspective view of a multimedia alarm and response module for use in connection with the subject invention.

Fig. D is an illustration of a basic IP video camera.

Fig. E is a block circuit diagram for the IP video camera of Fig. D.

Fig. F is an illustration of a signaling transducer unit.

Fig. G is a block circuit diagram for the signaling transducer unit of Fig. F.

Fig. H is an illustration of a sensing/signaling unit.

Fig. I is a block circuit diagram for the sensing/signaling unit of Fig. H.

Fig. J is an expanded block diagram for a highly integrated sensing/signaling unit.

Fig. K is an illustration of a hardwired IP video intercom.

Fig. L is a block circuit diagram for the hardwired IP video intercom of Fig. K.

Fig. M is an illustration of a wireless IP video intercom.

Fig. N is a block circuit diagram for the wireless IP video intercom of Fig. M.

Fig. O is a block circuit diagram of a contact/LAN interface with two channels

Fig. P is a block circuit diagram of an analog sensor/LAN interface.

Fig. 9 is a block diagram of a camera sensor for use in connection with the multimedia surveillance system to the display of the subject invention.

Fig. 10 is a flow chart showing the flow of data from a camera through the processing system of a multimedia surveillance system to the display in accordance with the subject

Fig. 11 is similar to Fig. 10 with the addition of a control processor.

Fig. 12 shows and alternative configuration using a high performance DSP with the embedded functions of Figs 10 and 12.

Fig. 13 is a diagrammatic illustration of a collateral triggering device for use in connection with the multimedia surveillance system of the subject invention.

Fig.16 is an integrated sensor/wireless LAN subsystem using DSP technology.

Fig. 17 is a perspective view of a multimedia camera tracking system for use in connection with the subject invention.

Figs. ____ through ____ are directed to streamed video and still imaging technology as incorporated in the subject invention, as follows:

Figs. ____ through ____ are directed to server functions including: (a) system configuration schemes, (b) clusters, (c) dispatch systems, (d) data logging and (e) data mining, as follows:

Fig. Q is an illustration of a clustered alarm workgroup scheme.

Fig. R is an illustration of a hybrid conventional logging system with LAN system combination.

Figs. S through ____ are directed to conventional system interfaces, as follows:

Fig. S is an illustration of a telephone system gateway configuration.

Fig. 8 is an illustration of the server dispatch capabilities for a system configured with the capabilities shown in Fig. 7 including telephone access, voice response and voice mail.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A basic wireless surveillance system is shown in Fig. 1. In this configuration a wireless camera or video sensor 20 is located at one remote location and a second wireless camera or video sensor 22 is located at a second remote location. The sensor 20 is shown as a video camera for purposes of brevity. It is an important feature of the invention that each sensor may include any combination of a variety of sensors or detectors for providing audio, visual, condition and event detection at the sensor operational zone. A more detailed description of specific sensor and detector capability is shown and described in my copending applications entitled: (WIRELESS AIRCRAFT AND GROUND BASED SURVEILLANCE APPLICATIONS).

In a typical operation sequence, the camera/sensors are polled, sending a high resolution image periodically. These images are archived on one or more servers. If an event happens, a full motion stream may be activated from one or more of the camera/sensors in the area of the event. The vide stream is routed to one or more monitor stations, one or more roving PDA monitor stations and is "recorded" on one or more servers in digital format. Sequential camera operation is accomplished by directing a series of identified cameras to swithch on and off their respective video streams in a predefined or programmed sequence. This emulates the timed sequential video switches commonly used for security surveillance. The sequence can be easily configured and reconfigured at the server. For example, a map of the sensors can be displayed. The sensors can be activated in the order they will be viewed. Switching can be by name, number or map location, using point-and-click technology. Once and automatic sequence is enabled, manual activation may be accocomplished by signaling a camera to turn OFF of deactivate its video stream and another to turn ON. This can also be accomplished by keyboard or other input command such as by a mouse click on the map locator.

[redacted]

The data is compressed based on need. Still images may be specified with low-loss compression such as wavelet, to preserve as much information as possible. Motion video may be specified with higher-loss compression to reduce the bandwidth requirements MPEG-1 or motion JPEG, for example could be specified for motion sequences. When the system is supporting a "non-alarm" condition of operation, the available network bandwidth may be allocated to support a maximum number of streaming feeds at lower resolutions. If a critical alarm condition occurs, not might a streaming feed be initiated from a sensor, an existing feed may be commanded to increase its data bandwidth for higher resolution. This may require reducing the bandwidth and resolution of other less critical feeds, or switching them into an OFF mode. Thus a completely dynamic bandwidth control scheme may be utilized to properly balance the number of streaming sensors, and the resolution and bandwidth of those sensors against the surveillance monitoring requirements at the scene of an event.

Positioning of the cameras may also have an effect on what resolution and bandwidth is needed. For example, a camera in a small space such as an elevator does not need to have as much resolution as a camera in a large area such as an auditorium or a cafeteria. The bandwidth of the cameras can, therefore, be allocated based on need, with the elevator camera programmed for less bandwidth/resolution and the cafeteria camera with more bandwidth/resolution.

Diagrams of various system configurations for LAN and wireless local area network (W-LAN) systems are shown in Figs. 14a, 14band 14c. As shown in Fig. 14a, with a camera sensor C1 for purposes of simplification, the camera C1 generates an analog signal which is converted to a digital signal at convertor 400 and then compressed at the motion video compressor 402. This can be accomplished by industry standard techniques such as motion-JPEG, MPEG, or motion wavelet compression or other current or future compression algorithms. The compressed digital

signal is then packetized by the LAN interface 404 and transmitted to the LAN 206 in well-known manner. An analog audio sensor such as microphone 419 is added in Fig. 14b and is supported the dedicated convertor 406 and compressor 408 for input to the multiplexer 410 where the compressed digital audio signal is combined with the compressed digital video signal to produce a complex multi-media signal for packetization by the LAN 404 interface. As shown in Fig. 14c, digital sensors such as motion detector 431 may also be included. The motion detector digital signal does not require conversion and is input directly into the multiplexer 410. As also shown in Fig. 14c, the LAN may be wireless, with a wireless transceiver 412 being incorporated in the system. As previously described, any portion of the system may be wired or wireless depending on ease of installation, mobility requirements and other issues. It may be noted that functions such as the motion video compressor, audio compressor, multiplexer and LAN protocol functions may all be performed as software and could operate on one high speed computer such as a Digital Signal Processor (DSP).

Turning now to Fig. 15, additional multi-media sensors may be incorporated in the system, as well, and may be wireless or hard wired as appropriate. For example, one or more audio sensors such as voice sensor 413 transmit audio signals to multiplexer processor 232. Various function sensors, such as, by way of example, an entire array of intrusion security sensors 415 may also be incorporated in the multi-media system of the subject invention. Where a plurality of such sensors are utilized, it is desirable to provide a local multiplexer system 238 to minimize the amount of duplicative hardware. In the example shown, all of the intrusive security sensors in array 415 require only a single transmitter and antenna as part of a local multiplexer 238 which may then feed a combined signal to the multimedia multiplexer 232. In a wireless system, the security sensor array may also be fully self-contained with an independent power supply.

As shown, a variety of image sensor devices may be incorporated, including the video cameras C1, C2, C3...Cn, an advanced imaging device such as an infrared camera 220 and the like. All of these produce a visual signal. In addition, various audio signals may be incorporated utilizing a variety of audio sensor devices, such as a voice sensor 413, two-way radios 224, 226 and a public address system 228. All of these produce an audio signal. The operational data signals are also incorporated, as previously described, and may include the GPS sensor 472, other navigational sensors 230, the various intrusion sensors 415 and other sensors 425. Thus, the system of the subject invention will accommodate a multiple input, multi-media array incorporating video, audio and digital data signals into a comprehensive database for providing detailed information relating to the condition of the monitored area at any time.

Each sensor device signal is introduced into a multi-media multiplexer network 232 which includes a image multiplexer subsystem 234, a dedicated audio multiplexer subsystem 236 and a digital data multiplexer subsystem 238, all of which produce distinctive multiplexed signals which are introduced into a master multiplexer subsystem 232 for producing a combined, comprehensive output signal, as selected, on each of lines 231, 233 and 235. It may also perform decompression functions for compressed command streams and compressed audio or video. The setup and control of the comprehensive output signal is provided by a master controller 241 and input to the multiplexer 232 at 243. The system controller receives commands and streaming audio information from other system elements and distributes them to controlled devices. The controller performs a command decoding function to sort out command and data streams directed toward specific devices and components of the system.

The visual and textual data is available at a display monitor 454. The audio signal is output at 237 to an audio output system such as amplified speaker 240. All of the data, including

all video, audio and digital data will be recorded on the recorder system 470. Information representing audio, video, sensor data, and other vital digital data is fed from the multimedia multiplexer to the recorder 470 over the signal lines 233. It should be noted that the multimedia multiplexer may be analog, digital, or packetized digital data type, or a combination of technologies based on application. Where desired, selected portions of the systems data may be linked to the base station as the combined, comprehensive output signal on line 246 to be transmitted via an RF transmission system or the like as indicate by the radio system 480 and the antenna 482. As previously described, the information may also be transmitted to a wireless satellite via transceiver 280 and dedicated antenna 282. Once the information is generated as a useable data signal, as indicated at line 231, 233 and 235, the controller, in combination with commands from monitor stations or servers, controls the collection, monitoring and review of the information. This permits access to any single sensor signal, or any combination via line 231 by sending a command via line 248 to the controller 241 for controlling the monitor related multiplexing switches via line 243 to control the signal output on line 231. For example, this may be a single camera view or an array of intrusive motion sensors 115.

Where desired, a light level detector may be is used for detecting light conditions such as the ambient lighting or transient conditions such as vehicle headlights or a flashlight. The light detector analog/digital convertor adapts the ambient light levels into a digital data stream. This digitizer runs at near real-time rates for "real-time" illumination monitoring. The light detector signal processor can be programmed to look for profiles such as rapidly increasing or decreasing light conditions that may indicate a vehicle or a flashlight as opposed to the rising or setting sun. Detection of such and event would trigger a specified unique alarm condition to be transmitted back to other elements of the system.

External contact sensors may also be deployed and a condition change may be detected and processed by the contact signal processor. These may be devices such as door contacts, special motion detectors such as trip wires and the like, floor pads and the like which can be connected, either by wires or wireless means to the contact detection circuit. Detection of such an event would trigger a specified alarm condition to be transmitted back to other elements of the system.

An audible speaker system can also be provided in the preferred embodiment and can provide numerous audio outputs such as, by way of example, voice output or a siren. This is a multi-function device and can be activated by local detection events, and by other system elements such as detection by a companion sensor unit signaling over the wireless system. The siren can indicate an area of concern, serve as a signal to security personnel and/or scare of intruders. The audible speaker can also be used to provide voice instructions or signals base on local detection events, and by other system elements. The controller produces the synthesized or stored voice signals. The controller can programmed or downloaded over the wireless system. The speaker system can also be use as a paging system by sending digitized or compressed voice signals over the wireless system to one or more multi-media devices. In addition, the audio speaker can be use conjunction with the audio detector 408 to communicate with the area.

Power is provided in the well-known manner. In the preferred embodiment, system power is used to power up the system through a convertor and a rechargeable battery system comprising a charger/controller and rechargeable battery supply.

In certain applications it may be desirable to combine many of the functions described herein, such as the signal processing, data multiplexing 232, LAN or WAN network transceiver 280, control and parts of the network interface, perhaps utilizing software running at high speed in a high speed DSP engine. This would serve to reduce hardware complexity, improve

reliability, reduce power consumption, and reduce cost. The network interface provides a wired interface to the system for connecting other system elements in a hardwired configuration. This can be any one of several well known but evolving technologies such as 10Base-T, the better 100 Base-T or high-speed Gigabit LAN or WAN technology. Such a configuration does not depart from the scope and spirit of the subject invention.

Fig. 16 is a diagrammatic illustration of an integrated sensor/wireless LAN subsystem using DSP technology. As there shown, the various analog sensors such the light sensor 300, the temperature sensor 302, the humidity sensor 304, and the sound or audio sensor 306 (as well as other sensors as previously described herein and as desired for application) produce analog signals which are converted at one of the dedicated analog-to-digital convertors 310 and then introduced into a multiplexer 312. The multiplexer 312 produces a combined digital output signal which is introduced into the DSP processor 314, which produces the system output on line 315, where it is again converted at convertor 316, amplified at amplifier 318 and transmitted via antenna 320. In the preferred embodiment, an integral power supply 322 is provided. The Sensor I/D address is on line 324. This system provides a highly integrated sensor/processor/transceiver and typically can be housed on a single chip using available configuration technology.

In the preferred embodiment, the system includes a plurality of strategically located video image sensors and/or audio sensors synchronized by a master synchronizing source, each sensor adapted for transmitting signals to a multiplexer for distributing the signals to monitors and archival recorders. Other sensors may also be incorporate in the system, such as motion sensor, smoke and fire sensors and the like. The system is adapted for selectively transmitting all of the data on a near real time basis. The system is adapted to provide the monitors access to serial, synchronized full screen view of each of the cameras, in sequence, or alternatively to provide split screen viewing of a plurality of cameras. The system may be hardwired or wireless transmission may be utilized to further minimize the possibility of a malfunction at the onset of a catastrophic occurrence.

Fig. 17 is a perspective view of a preferred embodiment of tracking camera sensor 510. In the preferred embodiment, the cameras are adapted to respond to several different types of control signals, including but not limited to:

X-axis position control as indicated by X-axis servomotor 550;

Y-axis position control as indicated by Y-axis servomotor 554;

Lens zoom control as indicated by motorized zoom lens 558; and

Iris control as indicated by iris controller. (The iris may also be automated).

As shown in Fig. 17, the camera system includes a base or mounting bracket 556 for mounting the system at location. The system body 552 is mounted on a tilt mount 554 (y-axis) and pan mount 550 (x-axis), permitting panning (x direction) and tilting (y direction) of the camera for scanning a wide area. A motorized zoom lens 558 is provided (z direction). The preferred embodiment of the system also includes an audio sensor such as directional microphone 560. The audio sensor may be an acoustic transducer, such as a microphone, that collects audio information from the surrounding area. The collected audio can be processed to detect potential emergency

conditions such as a gunshot or an explosion, or can be routed directly back to the monitoring station. Using the sensors of the subject invention, locational origin of an explosion or a gunshot or the like can be triangulated from multiple sensors and the positional origin can be calculated and displayed on maps as an overlay for assisting in pursuit of a perpetrator. The calculated origin can also be correlated by computer to the nearest appropriate emergency assets, base upon their known positions, and those assets may be automatically dispatched. The audio analog/digital convertor adapts the acoustic signal representing the audio environment into a digital data stream. The digitizer runs at real-time rates for real-time audio monitoring. The audio signal processor/compressor has two functions. It is programmed to perform detection in a number of different manners. For example, the processor algorithms can be adjusted to detect impulse noises such as gunshot or a small explosion. Detection of such an event would trigger a specified unique "alarm" for that condition to be transmitted back to other elements of the system. Other types of detection are also possible. By using frequency analysis transforms and signature profiles, noises from engines, door openings or other distinctive noises could be detected when warranted by the situation or condition. For audio surveillance applications, the compressor can also be used to provide bandwidth reduction for audio transmission. In this application, the amount of data representing a real-time audio stream would be reduced by using audio compression techniques such as LPC-10, or other well-known or proprietary algorithms. This allows better bandwidth utilization of the wireless and wired communications channels used by the system.

Illumination means such as the infrared illuminator 562 permits surveillance during low light or no light conditions, without detection by unauthorized personnel. A visual light/strobe light 563 can be turned on by locally detected events, by control signal, or by other system elements such as detection by a companion sensor unit signaling over the LAN. This light can illuminate an area

of concern, attract attention of security personnel as a signal, or scare away unauthorized personnel or intruders.

An integrated GPS receiver 564 is provided for generating location information. This is particularly useful for "drop-and-place" sensors as opposed to permanent sensors. Other features such as a laser range finder 566 that can measure distance to objects/personnel may be incorporated to further expand and enhance the capability of each sensor component. The camera system shown has full 360 degree field of view capability which may be controlled manually by remote control signals, may be programmed to pan the area on a time sequence, may track a moving transport using GPS signals from the transport or by using image processing "tracking software" processing the camera image, or may be responsive to and activated by an event occurrence such as from sensors distributed throughout the ramp areas, reporting activity over the LAN, in the well known manner. The range finder 66 permits the tracking system to locate objects in a precise manner and then provide control signals to permit accurate surveillance and monitoring of same, such as zooming the camera or positioning of other sensor elements. Each sensor and/or camera may incorporate a motion sensor and/or an audio sensor activation device so that the system may be activated when a sound or a motion occurs within the sensor range. The motion detector may comprise any transducer unit that can detect the presence of an intruder and can be a device such as an infrared motion detector, a thermal sensor, an ultrasonic detector, a microwave detector, or any hybrid of two or more of these detectors "fused" together to gain better sensitivity and/or improved detection accuracy. A motion detector convertor may be incorporated to convert the signal from either a single motion detector sensor or a battery of sensors to digital form for processing and/or transmission to other system elements. Multiple elements may be contained within a single sensor system package, or

may be fused for multiple sensors in geographically distributed elements with data to be fused being transmitted over the LAN. The motion detector signal processor is adapted for analyzing the sensor data streams from one or more sensors to provide for better sensitivity or improved detection accuracy. Well-known techniques may be implemented to process the transducer data and detect surges over the set thresholds that represent detection. The processor/compressor can also be configured to accept input from multiple sensors and process the inputs in a "fused" manner. For example, signals form an infrared detector and ultrasonic detector may be "added" together, then threshold detection performed. This ensures that both an optical and an acoustic return are detected before an alarm condition is broadcast. These and other more sophisticated well known techniques can be used together to gain better sensitivity and/or improved detection accuracy. Detection of such an even would trigger a specified, unique alarm condition to be transmitted back to the other elements of the system.

Typically, the sensors will "sense" the presence of unauthorized activity and activate recording from the various audio and/or video equipment and activate alarms. This will initiate the generation of a signal at each of the activated units. The generated signals will then be transmitted to the monitoring and recording equipment, as described, to permit both real-time surveillance and recordation of activity at the site. Motion detection may also be determined using video time/change techniques in the well-known manner.

Fig. 18 is a perspective view of a multimedia alarm and response module for use in connection with the subject invention. The "box" 600 is shown in a wireless configuration and, therefore may be located in any desired location irrespective of the presence of power and transmission cabling. A self-contained power supply can be provided or, where available, the box may be connected to the local power source system with integral emergency back-up in the well

known manner. The box may include any combination of signal switches such as "FIRE"602, "MEDICAL"604, "SECURITY"606 and the like. When activated, a signal will be transmitted to the base station via the wireless communication system as indicated by the WLAN antenna 608, by way of example. In the preferred embodiment, the box can include a microphone 610 whereby the user can communicate with the base station, a video camera 610 for provided visual identification of the person operating the system and an display panel 612 where instructions may be presented by the base station. An IR LED illuminator 614 may be provided to permit ambient illumination. For certain types of applications, such as a fire, an audible alarm 616 is incorporated and may be programmed to be automatically activated by pulling the appropriate switch, or programmed to be activated only when the base station sends an activation signal. Other detectors such as, by way of example, a smoke detector 618 may also be incorporated for automatically sending signals to the base station.

Returning now to Fig. 1, each camera has a transmitter connected to the antenna 23 to receiver antenna 25 for transmitting an RF signal o a wireless LAN receiver 24 connected to the intranet 26 at a location convenient for receiving the RF signal from the cameras 20, 22. The video and/or image signals captured and/or transmitted by the camera to the receiver are then transmitted to a monitor station 28 via the Ethernet or Intranet 26, wherein the signals are displayed on a monitor 30. The monitor station 28 is generally a CPU such as, by way of example, a Pentium class PC, wherein the raw data signals generated by the cameras and/or transmitted by the receiver are processed for display. The monitor station 28 may also include an input device such as, by way of example, the keyboard 32. An example of a suitable wireless LAN is the Proxim "Range LAN2" system or the Intercel Prism system, consisting of PCM/CIA cards for small portable devices and a base station that provides an Ethernet connection to the

Intranet. The monitoring station can "see and/or hear" data from the wireless camera(s) continuously, periodically as programmed, or upon event detection such as by motion detection, audio detection, contact closure or other independent system link. It will be understood that any number of cameras, image sensors audio devices and other suitable sensors may be connected to the surveillance system using this wireless system configuration. Of course, hardwired sensors can be incorporated in the system in combination with the wireless sensors, without departing from the scope and spirit of the invention.

In the typical application, the camera/sensor unit will include a combination of on board transducers or sensors as required to perform the full multimedia monitoring function. In the preferred embodiment, the camera includes a video camera for visual input based on conditions. For example, and as shown and described above, with reference to Fig. 17, the video camera may be monochrome or color and may have an image intensifier for operation in dark environments, and may include infrared night vision capability. The lens may be a zoom lens or an auto iris and/or have tilt and/or pan capability. The video may be processed in three distinct manners: (1) full motion stream--compressed to be delivered over the communications medium and typically the lowest resolution due to the volume of data required; (2) step video--higher resolution can be collected at a specified interval for better identification of certain features or components in the range of the camera; (3) still frame images--highest resolution and faster than full motion or step video. These three types of data may be delivered in combination or may be any selected combination. For example, a low resolution continuous stream of highly compressed full motion data may be sent from the camera/sensor to a monitor station to drive a screen. This will provide a typical "closed circuit" monitor of the scene at the camera/sensor. Authorized personnel may then command the sensor to capture and send a high resolution still image to the

monitor station if something appears to require additional scrutiny. If a sensor has been armed for event detection and activation, the sensor may be activated to capture and send the event signal to the screen, or periodic high resolution images may be captured and inserted. Various ranges of uses of this capability are within the intended scope of the application. The camera/sensor also includes adequate communications protocol to support the transmission. For example, Internet transmissions require TCP/IP or PPP protocols. Selected camera/sensors may be mobile and it may be desirable to determine their location in the system. Any number of techniques may be employed, for example, infrared beacon location systems, RF triangulation systems or GPS and the like. The camera/sensor may be equipped with an external sensor input or a dry contact input to trigger the sensor to capture data and generate an event. While the camera/sensor is typically equipped to accept external power such a low voltage DC, a backup internal power supply is desired. The wireless camera/sensor units include an RF subsystem, either external or internal, to communicate with the servers and monitors of the system.

In many cases the comprehensive camera/sensor will also include other devices such as an audio subsystem for collection of audio data, motion sensors, heat sensors, smoke and vapor detectors, and/or the like. Typically, the camera sensor will include a temporary memory store. This way, if signal transmission occurs upon the detection of the event, the camera/sensor can send data relating to the time just prior to the event, limited only by the on board memory capacity. A detailed description of a typical camera/sensor in accordance with the invention is provided in connection with Figs.9-13 herein.

An enhancement of the system of Fig. 1 is shown in Fig. 2, wherein a router 34 is connected to the Intranet as a gateway to the Internet indicated by 36. This permits a remote monitor station 38 to be connected to the system anywhere where there is Internet access. As with

the on-line monitor station 28, the remote monitor station 38 is a CPU with an output or display device 40 and an input device 42. This system will support an installation requiring remote or centralized monitoring, and is particularly well suited for installations where signal distribution over a large geographic region is required. This system provides essentially worldwide and low cost access to the capability of the system. Any combination of local (Intranet) and remote (Internet) monitoring stations can be employed.

A server based system is shown in Fig. 3 for use in combination with a wireless LAN system. In this embodiment, a wireless monitor 44 having a transceiver and antenna 45 for communication with the wireless LAN receiver is also included. This is typically a mobile unit such as a PDA or the like, and is usually used in combination with the base monitor station 28, whereby roving equipment and personnel may have access to the surveillance system. A server 46 has also been incorporated in the system and is connected to the Intranet in well known fashion. This substantially enhances the functionality of the system over the direct communication systems of Figs. 1 and 2. The server provides a centralized location for data collection, alarm detection and processing, access control, dispatch processing, logging functions and other specialized functions as described herein. Data is sent to the server, logged and dispatched based on criteria determined by the server. The server can essentially "crosspoint switch" receiving data from a multitude of sensors and switch it to a multitude of monitors in a specific manner. One important, but not necessarily essential, feature of the server is the ability to use standard Internet tools and techniques, such as TCP/IP, HTML and browser support that will allow nearly universal access to the system with the proper security access codes. This allows nearly every Internet station to participate in the network if needed, without specialized software.

Fig. 4 is an expanded system using Internet connection between the receiver 24 and the various other components such as the server 46 and one or multiple monitoring stations 28-28n. The server may be located virtually anywhere on the Intranet/Internet. This system would be a very useful configuration where a service provider supported a number of surveillance installations for various client utilizing a single master server. The topology of the network will be established by the geographic parameters of an installation. Multiple servers may also be used for size, performance and redundancy issues.

Where physical wiring is prohibited or difficult to impossible to install, the wireless carrier configuration of Fig. 5 is useful. In this configuration, any one of various common wireless carriers, as indicated at 47, transmit the data directly to the Internet or Internet gateway 48, where it is distributed in the manner previously described. Any carrier with a gateway to the Intranet used or with a gateway to the Internet may be used. For example, CDPD data service, Internet connected two-way pager service, digital cell phones, or an Internet connected satellite service such as Iridium service can also be used. Other services that do not fundamentally have an Internet gateway , can be used once provided with an access path to the server or to an Internet gateway. For example, conventional (non-digital) cellular service does not have an Internet connection. However, an ISP can be called to provide the Internet connection. As shown in Fig. 6, one or more wireless monitors 44-44n can also be connected in this fashion. For example, a PDA is outfitted with a CDPD link and is adapted for receiving alarm events or multimedia data over a wide region without wires. In this configuration, the wireless carrier can also be a wireless LAN for smaller regions. A wireless link to a monitor device is particularly useful for mobile units such as a roving security officer. When an event occurs the roving officer can be notified

while on rounds with the type of event, the location and supplied with other multimedia data such as images and/or maps and/or audio.

Fig. 7 is an extensive multimedia surveillance system incorporating all of the heretofore described features of the invention. In this example, three separate buildings or locations in three different geographic regions are monitored and connected to the system as indicated by the three wireless systems Wireless 1 (W1), Wireless 2 (W2) and Wireless 3 (W3). Each location has a plurality of cameras as indicated by W1-20, W1-22; W2-20, W2-22; and W3-20, W3-22. Each wireless carrier or wireless LAN W1, W2, W3 transmit the signals to the associated gateway W1-48, W2-48, W3-48, respectively, via which the respective signals are introduced to the Internet 36. As shown, hardwired sensors such as cameras 50 and 52 may also be deployed. The transmitted data is then routed through one or more routers 34, 34n to various monitor stations 28-28n via associated Intranets 26-26n. A central server 46 is connected to the Internet and operates as previously described. Additional servers may also be employed as previously described. The Intranet facilities are protected by traditional firewalls and bridged through the routers. The focus of the system is the server that is shared by all building surveillance sensors and all monitor stations. The server is located on the Internet and is also firewall protected with controlled access. In a typical installation, the surveillance units in building 1 supported by Wireless 1 (W1) both wired and wireless, will be mapped to a monitor station in building 2 supported by Wireless 2 (W2) and may also be mapped to a monitor station off site, and so on, permitting monitoring from a location remote to the surveyed building. This would be particularly useful, for example, in monitoring school campuses from a remote location. Additional servers are often employed to provide redundancy. The specific network configuration employed, including the type of wireless carrier used (WLAN, CDPD, cellular, pager and the like) is

determined by geographic configuration, cost and availability of the services in the particular geographic area and the intended functions and scope of surveillance system.

Fig. 8 illustrates examples of the server dispatching techniques which may be employed by the server supported multimedia surveillance system of the subject invention. It is intended to illustrate examples and is not intended to be all inclusive. As there shown, once the data is available to the server 46, it may be managed and processed in a number of different ways to maximize the use of the data for monitoring, logging, archiving and response issues. The data is typically sent to system monitors such as monitor 28 which may be on the local wireless Intranet or may be located elsewhere on the Internet. The data and various control signals may also be dispatched via various communication systems such as public telephone lines 60 and Internet and ISPs as indicated at 58. System information may then be distributed via normal means to pagers P1-Pn, voice cell phones C1 and/or digital cell phones C2, to land line telephones T1, to PDAs PD1, to voice mail service systems V1 and to other remote monitoring stations M1. Control signals, response data and other data and information may be introduced into the system via the same systems.

In a typical operation, the server can be used to process various event notifications. For example, the server can arm sensors for detection of external events, audio detection, smoke or vapor detection, heat detection, and/or video detection. If an activated sensor is triggered, the server can dispatch alarm conditions in several ways, including sending:

- messages to specifically assigned monitoring units;
- a telephone call to designated land line numbers with an audio message describing the event;

- a telephone call to a designated wireless telephone number with an audio message describing the event;
- a numeric pager message with transmitted number signifying a voice mailbox message that contains a server generated audio message describing the event;
- a voice pager message with audio message describing the event;
- a text pager message describing the event;
- a text message to a wireless PDA;
- E-mail message to a digital cellular phone;
- graphic message sent to a wireless PDA device, such as message showing a map, collected images and the like;
- E-mail to any e-mail accessed party via fixed terminals.

The server can also notify multiple parties, or can notify and wait for confirmation such as a tone back on a telephone or a reply on a two-way wireless system. If the confirmation does not come back, the server can automatically go on to the next notification on the list. One suitable method for determining what stations and units to notify is a predefined notification list that maps sensors and types of events to particular parties. Primary parties and secondary or backup parties may be identified. Time frames can be assigned. For example, perhaps three individuals are "on call" during one day and the notification is assigned based upon the time of day. A second method is to interface the time accounting system to see who is "clocked in" at a particular time. That individual would automatically be the priority contact during the period of time he is clocked in. GPS tracking of personnel can also be used to notify the closest personnel, the closest monitor and to track and route the event and the event response. For example, personnel can be directed

to the event using GPS signal monitoring and management to identify both the precise location of the event and the closest response personnel.

The server is the heart of the system and not only controls dispatch and distribution of collected surveillance data but also controls the function of the various system components. The server is utilized to monitor camera status, and monitor station status. It also monitors the system for alarm signals and responds with appropriate dispatch of response triggering information. The server is programmed to log and archive information for later recall and is adapted to crosspoint switch between units and monitors. The server is programmed to define zones and to activate and deactivate zone and provide access authorization to a zone or to a monitor station. The status of all wired and wireless sensors is monitored and a malfunction or failure to respond is logged with proper response triggering information (such as "ALARM" condition, for example) dispatched to the appropriate monitoring stations and units. The monitor stations will be monitored in a similar manner. Event detection such as sensor triggering or motion sensing is likewise monitored, logged and reacted to. The multimedia sensor data, such as audio, video, step video and individual images are sent to the server by the camera/sensor unit by the available communications circuit and archived for future use. The data is time "stamped" with additional information such as time of collection, sensor identification, trigger condition if applicable, and other significant data, for example environmental data such as temperature, humidity, light, smoke, vapor and gas levels and the like.

In crosspoint switching the data, the system collects input from a multitude of sensors and can distribute event detection, alarm conditions and/or sensor data to a multitude of monitor stations. The server can perform as an N-by-N switch, mapping any combination of data from any camera/sensor unit to any one or more one or more monitor station(s) and/or other receiver units.

For example, a sensor may have a camera for motion detection and/or may have a temperature sensor. Periodic images may be sent to a localized monitoring station. Motion detection from an armed sensor may facilitate sending text alarm conditions to a roving guard (such as can be done using an alpha-numeric pager, for example), maps, GPS direction and location, still frame and image display, as well as sending critical data and response information, and/or full alarm data to the localized monitoring station near the sensor and to a centralized company wide monitoring station for high level supervision. Other work stations in close proximity to the triggered sensor can be notified on the Intranet. Any matrix of mapping of the sensors, routing conditions and designated receiving monitor stations can be orchestrated by the server.

The server can define zones for the sensors and monitor stations and manage and control by zone. Sensor unit and monitor station firmware and software may be maintained at the server allowing for system wide maintenance and upgrade at a central location.

The server can provide a sensor map and event map based on location of sensors and monitoring of events. Where moving sensors are included in the system, the server will keep track of the sensor either by tracking the location of the mobile sensor through periodic polling, periodic sensor transmissions or GPS. Typically, the mobile sensor will be tracked on the map.

The server will also provide other typical function such as area or zone monitoring to track personnel in the zone, controlling access authorization and controlling and monitoring logging and call back requests. The system can also generate an alarm if personnel and/or equipment enters an unauthorized area as monitored by the server and various devices.

Figs. 9-13 illustrate various camera/sensor configurations and applications. A basic camera is shown in Fig. 9. This embodiment supports compressed full motion video, step video, still frame video, compressed audio, geolocation, RF link, and optional sensor component input.

The processor of the camera is programmed to operate in the manner described to support the functions of the multimedia surveillance system of the present invention. The camera 70 collects data for storage in the temporary video memory 72. The data may stored in its raw form or may compressed as JPEG, MPEG, and the like, as indicated at the video compressor 74. The compression and storage functions are controlled by the processor 78 as programmed and controlled by the firmware 80. An audio sensor such as microphone 82 is also provided, and the raw audio signal is compressed at audio compressor 84. Various additional sensors 86 may be included as desired for each particular application. A storage memory 88 is provided for recalling sensor data, as previously described. Where desired, the system can also be programmed to record continuously to look at all data after an event has occurred. The output data is transmitted via an output line 90 and may be hard wired, or may be wireless and connected via an RF link 92 as indicated. Mobile cameras will include a geolocation system 94, as previously described.

Fig. 10 is a more detailed diagram of the camera electronics and shows the camera 70 as an analog capture device communicating with an analog to digital (A/D) convertor 100 for generating a digitized signal to sent to the motion coder 102 and the still frame compressor 104. As previously stated, the images are stored in the memory 106 for later recall and reconstruction of events. The data is combined at combiner 108 and transmitted via communications interface 110 the communications channel or circuit 112 such as, by way of example, cellular, RF, land line telephone and the like. The signal is then received at the communications interface 114 at a remote location and stored for archiving purposes at mass storage unit 116. The data is extracted at 116 and introduced into a motion decoder 118 and still frame decompressor 120. The output is then produced on the monitor 122 through the D/A convertor 124. The switch 126 is used to select either motion video via motion decoder 118 or still frame images via the still frame

decompressor 120. The still frames are stored in memory 128 and may be hard copy printed at printer 130.

An alternative camera circuit configuration is shown in Fig. 11. In this embodiment, the digitized signal from the A/D convertor 100 is introduced into the MPEG encoder 132 and the DSP134, which includes a memory 136 for storing still images. The encoding and compression processes are controlled by a control processor 138. The signal are then combined at a multiplexer 140 and introduced into a modem 142 for delivery to the communications channels 112. The remote modem 144 receives the transmitted signal and introduces it into a demultiplexer 146 from which it is introduced into the MPEG decoder150 and the DSP 152, which is controlled by the control processor 148. A still frame memory 160 is included. The signal is the again multiplexed at 154 and converted to an analog signal at D/A convertor 156 for display at monitor 158. The still images may be hard copy printed at printer 162.

As shown in Fig. 12, all of the functions of the camera system can be performed using the high performance DSP 132 in combination with the camera 70 and the A./D convertor 100 on the input side and a memory 106. The output of the DSP is converted to an analog signal at D/A convertor 134. A digital camera may be substituted for the analog camera described, eliminating the need for the D/A convertor 100.

A remote triggering configuration is shown in Fig. 13. For example, a forklift truck 170 may be outfitted with a geolocation system as indicated by the antenna 171. When the forklift is detected by the geographic locator to be in the field of view of the camera 70, the server will send a signal to the camera/sensor 70 via antenna 71 to activate the camera/sensor and collect data for transmission to the system. Other activation sensors can be used as well. For example, the proximity sensor 172 may activate the camera/sensor 70 whenever anything is within the range

of the proximity sensor. The proximity sensor signal can be directly triggered to the camera or can be sent back to the server for management in accordance with programmed techniques. This will permit specific data collection of images in selected area and can provide a permanent archival record of any objects that may have been in the vicinity of the camera during the time the camera is activated.

The invention provides a comprehensive surveillance scheme permitting both local and remote monitoring and management. While certain features and embodiments of the invention have been described in detail herein, it will be readily understood that the invention encompasses all modification and enhancements with the scope and spirit of the following claims.

CLAIMS

1. A comprehensive multimedia surveillance system for monitoring an area or location without requiring hardwired sensors, the system comprising:

   a. a wireless sensor for detecting events in a area under surveillance and collecting data for recording the event;

   b. a wireless transmitter for sending the data;

   c. a wireless receiver for receiving the data at a location from the sensor;

   d. a monitor station;

   e. a communication system for communicating the wireless receiver with the monitor station for transmitting the received data to the monitor station.

2. The surveillance system of claim 1, further including a display screen associated with the monitor station for displaying the collected data.

3. The surveillance system of claim 1, further including a memory associated with the monitor station for archiving the collected data.

4. The surveillance system of claim 1, wherein the communication system for communicating the wireless receiver with the monitor station comprises a hardwired local area network.

5. The surveillance system of claim 1, wherein the communication system for communicating the wireless receiver with the monitor station comprises a wireless local area network.

6. The surveillance system of claim 1, wherein the communication system for communication the wireless receiver with the monitor station comprises a gateway to the Internet and the Internet, and wherein the monitor station is at a remote location having Internet access.

7. The surveillance system of claim 1, wherein the sensor includes an analog camera.

8. The surveillance system of claim 7, wherein the sensor further includes an audio sensor.

9. The surveillance system of claim 7, wherein the sensor further includes an event detector.

10. The surveillance system of claim 9, wherein said event detector is a motion detector.

11. The surveillance system of claim 9, wherein said event detector is a heat sensor.

12. The surveillance system of claim 9, wherein said event detector is a proximity switch.

13. The surveillance system of claim 9, wherein said event detector is a latch.

14. The surveillance system of claim 1, wherein said sensor is a digital camera.

15. A comprehensive multimedia surveillance system for monitoring an area or location without requiring hardwired sensors, the system comprising:

a. a wireless camera sensor for visually monitoring an area under surveillance and collecting image data for recording the event;

b. a wireless transmitter for sending the data;

c. a wireless receiver for receiving the data at a location from the sensor;

d. a monitor station including a display screen for displaying the event data;

e. a communication system for communicating the wireless receiver with the monitor station for transmitting the received data to the monitor station.

16. The surveillance system of claim 15, the monitor station further including a memory for storing the event data.

17. The surveillance system of claim 15, further wherein the communication system is a local area network and the monitor station is on the local area network, and there is further included an Internet gateway for transmitting the collected data over the Internet and a second monitor station having Internet access and located on the Internet for receiving the collected data.

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18. The surveillance system of claim 15, further including a server for receiving and distributing the data, the server distributing the data to the monitor station via the local area network.

19. A comprehensive multimedia surveillance system for monitoring an area or location without requiring hardwired sensors, the system comprising:

a. a wireless sensor for detecting events in a area under surveillance and collecting data for recording the event;

b. a wireless transmitter for sending the data;

c. a wireless receiver for receiving the data at a location from the sensor;

d. a server;

e. a communication system for communicating the wireless receiver with the server for transmitting the received data to server.

20. The surveillance system of claim 19, the server adapted for processing and distributing the data, the surveillance system further including a monitor station in communication with the server for receiving the data.

21. The surveillance system of claim 19, the monitor station further including a display screen for displaying data distributed to it by the server.

22. The surveillance system of claim 19, the monitor station further including a memory for storing the data distributed to it by the server.

23. The surveillance system of claim 19, wherein the communication system is a hardwired local area network and the sever is on the local area network.

24. The surveillance system of claim 19, wherein the communication system is a wireless local area network and the server is on the local area network.

25. The surveillance system of claim 19, wherein the communication system includes a gateway to the Internet and the server is on the Internet.

26. The surveillance system of claim 25, wherein the communication system further includes a local area network associated with the receiver and the monitor station is on the local area network.

27. The surveillance system of claim 25, wherein the monitor station is on the Internet.

28. The surveillance system of claim 1, the sensor further including a receiver for receiving signals from the monitor station and the wireless receiver further including a transmitter for sending signals to the sensor, the monitor station further including an input device for sending control signals to the sensor.

29. The surveillance system of claim 28, further including a server, wherein the monitor station communicates only with the server and the wireless receiver communicates only with the server.

30. The surveillance system of claim 19, the server adapted for collecting and distributing the collected data to distribution points, said distribution points comprising monitor stations for receiving and reacting to the collected data.

31. The surveillance system of claim 30, wherein a distribution point comprises a two-way communication device adapted for sending a response signal to the server when data is received.

32. The surveillance system of claim 31, wherein said communication device is a voice cell phone.

33. The surveillance system of claim 31, wherein said communication device is a land line telephone.

34. The surveillance system of claim 31, wherein said communication device is a two-way pager.

35. The surveillance system of claim 31, wherein the communication device is a voice mail service.

36. The surveillance system of claim 31, wherein the communication device is a digital cell phone

37. The surveillance system of claim 31, wherein the communication device is a PDA.

38. The surveillance system of claim 1, further including wired sensors associated with the communication system.

39. The surveillance system of claim 15, wherein the camera captures full motion video.

40. The surveillance system of claim 39, wherein the camera is programmed to capture step action video.

41. The surveillance system of claim 39, wherein the camera is programmed to capture still frame images.

42. The surveillance system of claim 31, wherein the server is programmed to send information messages to specific communication devices upon receipt of specified data from the sensor.

43. The surveillance system of claim 31, wherein the communication device is mobile and further includes a geolocation device and wherein the server communicates to the mobile device in closest proximity to an event when event data is received from the sensor.

44. The surveillance system of claim 15, wherein the sensor is mobile and further includes a geolocation device for generating and sending tracking data to the server, and wherein the server tracks the location of the mobile sensor.

ABSTRACT

A comprehensive, wireless multimedia surveillance and monitoring system is adapted for transmitting event data, video and/or image monitoring information, audio signals and other sensor and detector data over significant distances using digital data transmission over a wireless LAN, Intranet or Internet for automatic assessment and response including dispatch of response personnel. Both wired and wireless sensor systems may be employed. GPS dispatching is used to locate and alert personnel as well as to indicate the location of an event. Automatic mapping and dispatch permits rapid response. The wireless LAN connectivity permits local distribution of audio, video and image data over a relatively high bandwidth without requirement of a license and without relying on a common carrier and the fees associated therewith. The surveillance system may be interfaced with a WAN (wide area Intranet) or the Internet for providing a worldwide, low cost surveillance system with virtually unlimited geographic application. Centralized monitoring stations have access to all of the surveillance data from various remote locations via the Internet or the WAN. A server provides a centralized location for data collection, alarm detection and processing, access control, dispatch processing, logging functions and other specialized functions. The server may be inserted virtually anywhere in the Intranet/Internet network. The topology of the network will be established by the geographic situation of the installation. Appropriate firewalls may be set up as desired. The server based system permits a security provider to have access to the sensor and surveillance data or to configure or reconfigure the system for any station on the Internet.